the OIL AND GAS JOURNAL
PUBLISHED WEEKLY JANUARY 30, 1961

How did 1960's performance compare with that of other years? What's in the cards for 1961? For a look at the records and forecasts, turn to the Journal's annual

p. 102

REVIEW-FORECAST

Oil men will buy more steel goods in '61 ▸ 81

Automatic welding hits the right-of-way ▸ 84

East Coast may try methane this year ▸ 90

Saharan oil won't upset the world market ▸ 98

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"Produce more so we can use more" say 120 million car riding Americans who pay silent tribute each day to the fact that the better way of life stems from petroleum.

Our responsibility to these car riding Americans is, and will continue to be, as a partner of the petroleum industry, to help you find and produce the products this moving traffic world needs and uses.

We'll be here to answer the challenge.

HALLIBURTON COMPANY • DUNCAN, OKLAHOMA

OIL AND GAS JOURNAL
Vol. 59, No. 5

Contents January 30, 1961

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The OIL AND GAS JOURNAL Newsletter

Tulsa, Okla.
Jan. 30, 1961

Drilling is off to a slow start for the year:

Rotary rigs active in the first 4 weeks of January averaged only 1,617, lowest for the month since 1947.

Activity last year in the same period averaged 1,692 or 75 more. The industry last year drilled 46,751 wells and this year has programed 46,964.

Tempo of drilling will have to be stepped up if the well program is to be reached (p. 82)*.

Despite early drilling figures, indications point to an upswing this year in the supply business.

Journal survey finds that both the operators and supply houses expect increased buying for one big reason: Companies have cut their supply inventories to the bone and will have to buy this year to cover current projects.

Upswing already is being felt mildly in tubular goods and will pick up later in the year with drilling. Outlook for production equipment and other items is steady (p. 81).

▼ ▼ ▼

Latest on some problems in Texas:

The expanding battle in Texas over small-tract drilling has TIPRO undecided which way to jump.

Unitization Committee of the association has met twice this month to consider modifying its long-standing opposition to compulsory unitization and forced pooling. Torn between widely different views of its members, the committee adjourned with no visible progress. It may meet again in a month.

Push now seems unlikely among Texas independents for tighter ratable-take laws this year. It was considered sure thing only a few weeks ago.

Independents now say they have assurances the majors will use "business statesmanship" in purchasing oil.

Major reason for the change: Independents and majors both see urgent need to close ranks for a fight against big

---

*Refers to article in this issue giving more details. When no page is given, the item is a Newsletter exclusive.

increases in state oil and gas taxes this year.

Permian basin gas producers are putting great emphasis on the FPC prehearing conference March 6 in Midland on new area-pricing formula for that region.

Gas producers have already held preparatory meetings in Houston and Dallas to develop data on gas exploration and production.

Operators feel facts developed at the Midland meeting are certain to have an effect on decisions involving gas produced in other areas.

Texas Railroad Commission in holding February allowable to 8 days shows it is not yet ready to open up state's oil wells in battle to regain some lost crude markets.

The commission's dilemma: Continued low allowables are costing Texas producers markets but any big jump in production to keep markets will likely break prices (p. 92).

▼ ▼ ▼

Watch for action in Congress to pick up as soon as the Kennedy administration makes its first moves.

This does not mean Congress will be a rubber stamp—but Kennedy recommendations will provide a starting point for legislative action.

L. J. O'Connor is being considered for appointment to the Federal Power Commission. But better bet is that he will continue as oil import administrator at least for the immediate months ahead.

Question whether to exempt asphaltic crudes from import controls has been left with the new administration. Office of Civil and Defense Mobilization was on the verge of refusing exemption but decided at last minute to hold off.

▼ ▼ ▼

Discovery of four new fields in a single week puts South Louisiana well along the way this year to match the 42 new fields found during 1960.

This week's discoveries, all within a radius of less than 40 miles of each other, include: South Happytown and Veltin on opposite sides of St. Landry Parish and two unnamed areas in Acadia and St. Martin parishes.

Move is underway in Idaho to post a bonus for the first commercial oil well drilled in the state.

Bill has been introduced in current session of legislature providing for payment of $50,000 for first well to produce not less than 50 bbl. of oil daily for at least 60 days.

World's second sextuple producing well—and the first sextuple to flow both oil and gas—has been completed in McFaddin field of Victoria County, Texas, by Sunray.

First sextuple well was completed by Sunray last May in Jackson County and produced gas from six different zones. The second one has calculated open flow potential of 98,400 M.c.f. of gas and 126 bbl. of oil daily from zones ranging in depth from 2,835 to 5,285 ft.

▼ ▼ ▼

Plans for a liquefied-natural-gas plant on the East Coast are being studied for a group of utilities to meet their peak-day demands (p. 90).

Promising new method of underground storage may give the project a boost. Tests have been encouraging using pre-stressed concrete tanks with an insulated roof and metal liner.

Cost of building the subsurface concrete tanks is put at $0.80 to $1.50 per M.c.f. of tank capacity. This is much less than the $2.85 to $3.45 per M.c.f. cost for storage in aboveground tanks.

International competition looms over rival automatic pipeline welding equipment.

Esso has taken the wraps off its push-buttom operated, CO_2 shielded-arc process which will automatically weld pipe on the right-of-way. The machine on tests has welded small diameter pipe (4, 6, and 8-in.) in 1 minute and can be used on 30-in. pipe (p. 84).

Russia in the same week put out feelers in New York for selling its resistance-welding machines. The Soviets claim to have been making welds automatically since 1956.

▼ ▼ ▼

European refiners are having double trouble getting their yield patterns into balance.

These trends complicate the usual headache of too much gasoline from a barrel of crude:

Demand for middle distillates is growing at a faster rate than that of gasoline and resid demand is static.

New crudes coming in from North Africa are lighter gravity thus adding to the strain of making more distillates and less gasoline.

Merger and sales: Look for some action within next 30 to 60 days toward merger of Douglas Oil of California with a major oil company. Rumors link Douglas with two possible buyers—Continental which has no marketing on the West Coast and Humble which is just breaking into the market...Northern Natural Gas is buying Monterey's 16% interest in Transwestern Pipeline for $11,857,000 or $12.50 per share...a $12-million merger of Reed Roller Bit into Dresser is in the mill.

Market Memo

Jan. 30, 1961

Record cold weather in the East really put a kick into fuel oils over the country.

Quickened demand on the East Coast had these results:

Cleaned out the spot market for No. 2 on the Gulf, caused a one-fourth cent price rise, started light oils moving down the Mississippi, and tightened the Mid-Continent market.

The new demand cleaned out all spot cargoes on the Gulf for January and left only two for late February lifting. This kind of situation sent the price there up a quarter cent, making new posting for No. 2 at 9.25 cents per gallon.

The big news is the river movement which reverses the normal trend and reveals just how short Gulf suppliers are.

Two cargoes of light fuel oils moved down river last week at one-eighth cent off Gulf posting delivered.

Other big deals called for barges of No. 2 priced at mid-river points at three-eighths off the Gulf.

One big refiner with an Illinois plant is sending large slugs of No. 2 down river throughout February to supply its East Coast customers.

This movement should help the Mid-Continent No. 2 market because it will lure material east to the river.

Look for the East Coast price to react to all this tightened supply with a one-fourth cent raise too. Then it will bump into gas competition.

Paradoxically some discounting persists in New England weak spots, but they face extinction soon.

Refiners had better cash in on their fuel oil because they are facing trouble later with gasoline.

Stocks are building fast on the motor fuels, and demand is listless.

A surge in refinery runs will spell trouble just when refiners need higher prices to pay increased labor costs.

Straw in the wind: Four-product stocks from Nov. 25 to Jan. 13 dropped 47 million barrels for average of 6,700,000 bbl. per week. Last week they dropped only 618,000 bbl. in face of big distillate withdrawals. Explanation is increase in gasoline stocks.

Gasoline is available on the Gulf for a half cent off but refiners won't talk price because they have no buyers. Material can be had on the river for half to a quarter cent off. Market is sagging in the Mid-Continent. Marketers on both the East and West Coasts are holding their breath on the gasoline price, hoping none shakes the fence. Weak spots are cropping up but haven't spread.

From TOP to BOTTOM

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LOUISIANA—New Iberia, Shreveport
MISSISSIPPI—Gladewater
NEW MEXICO—Farmington, Lovington
OKLAHOMA—Duncan, Oklahoma City, Poteau Valley, Sapulpa, Tulsa
TEXAS—Corpus Christi, Borger, Colorado City, Dallas, [illegible], Midland, Odessa, Pampa

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Yours very truly,

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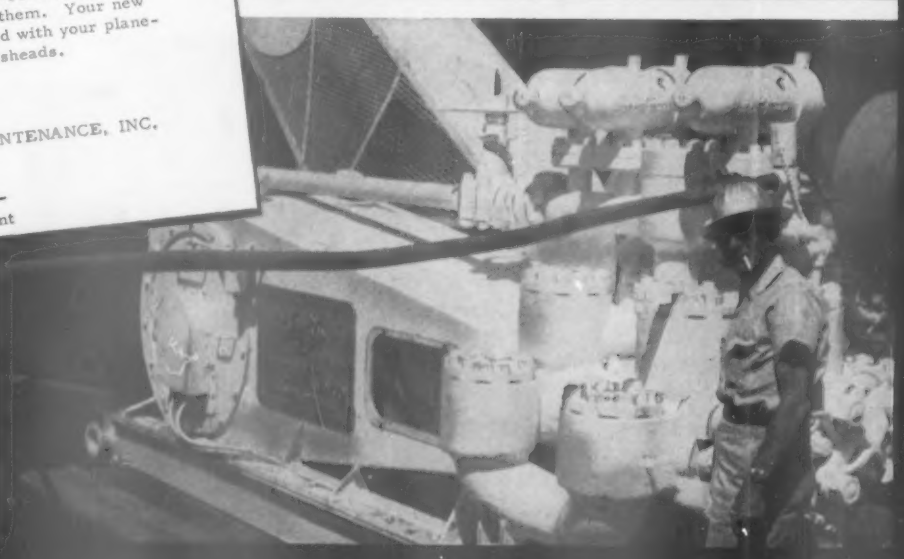
J. K. Butler, President



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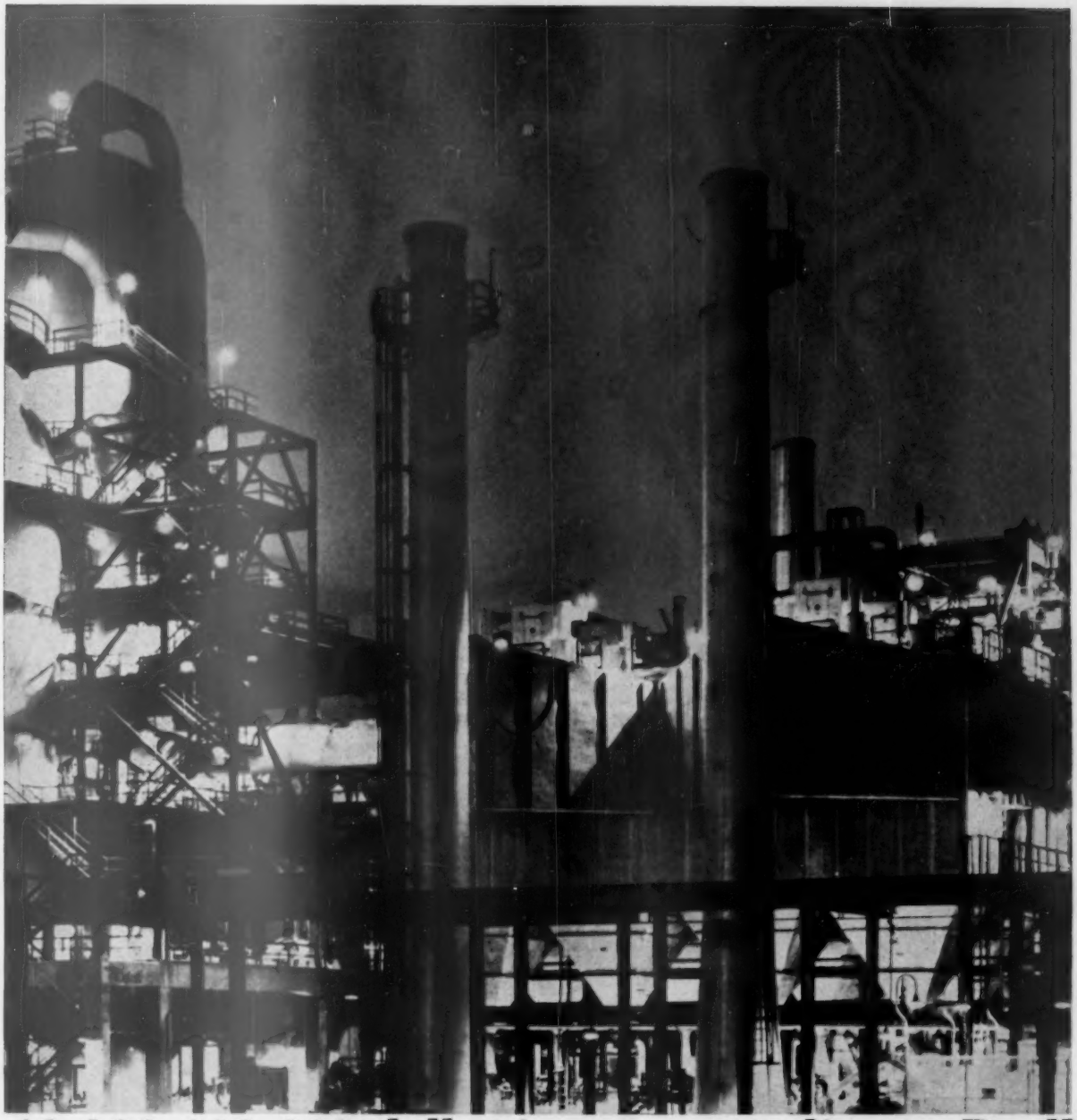

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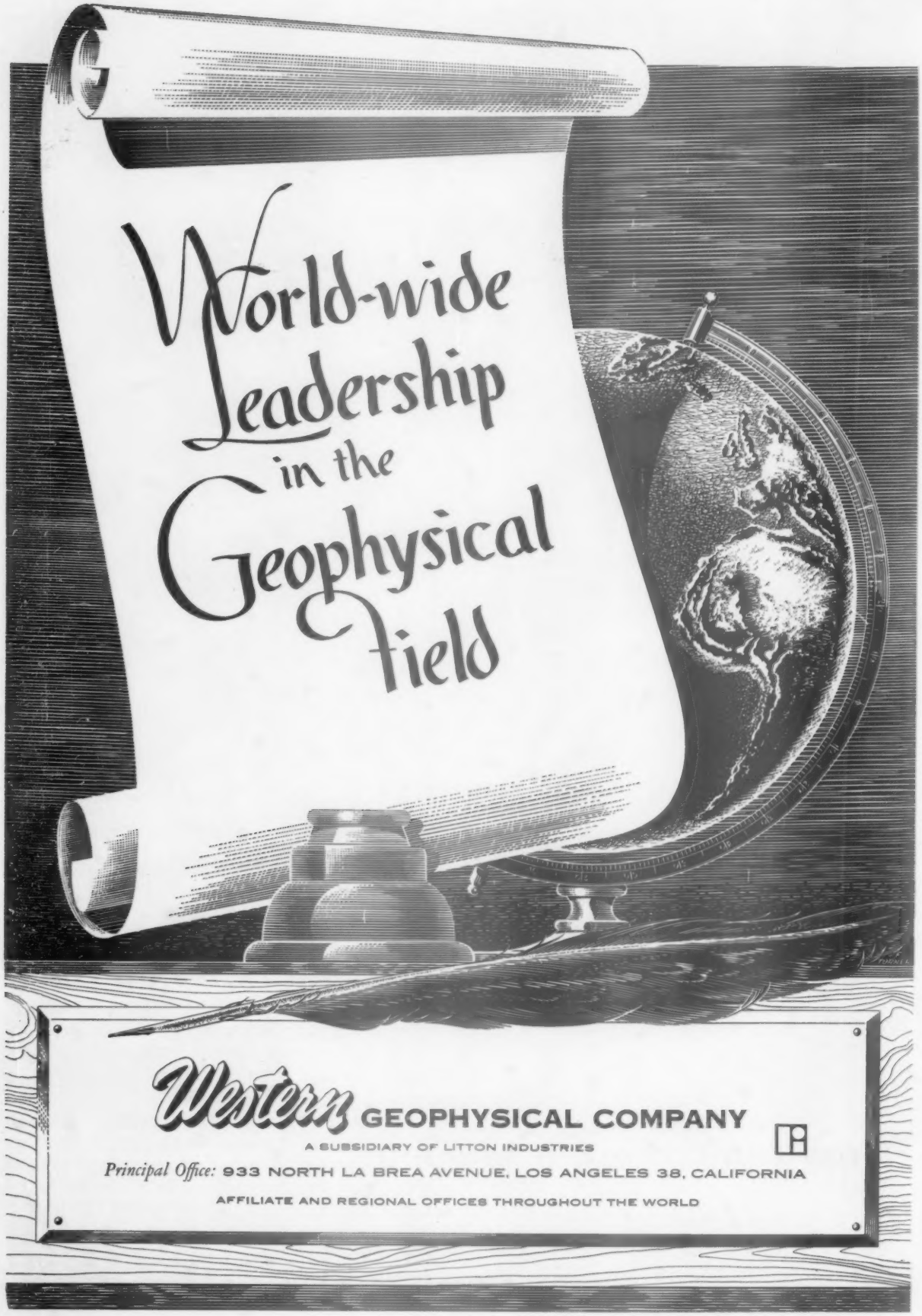

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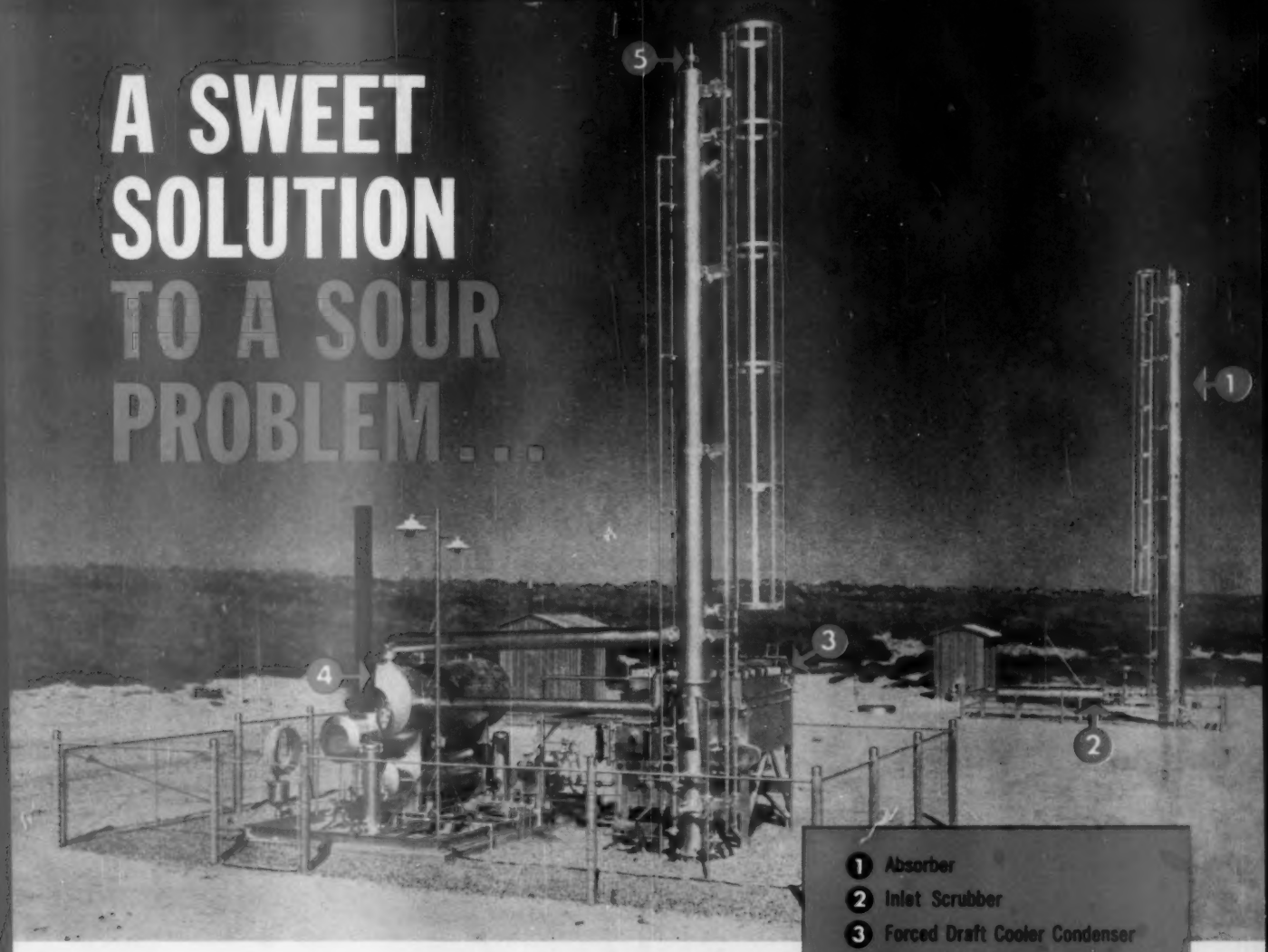

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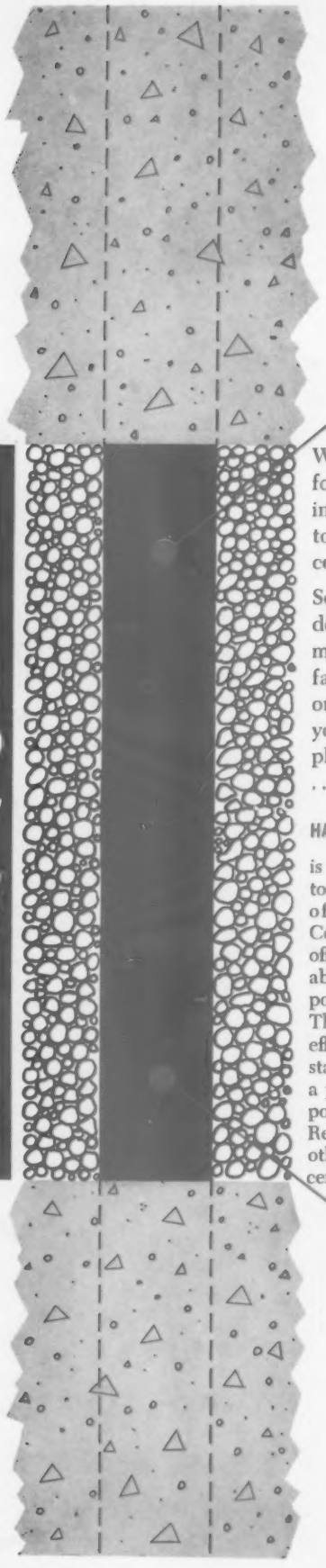

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HALLIBURTON "DV" PACKER CEMENTING COLLAR . . .

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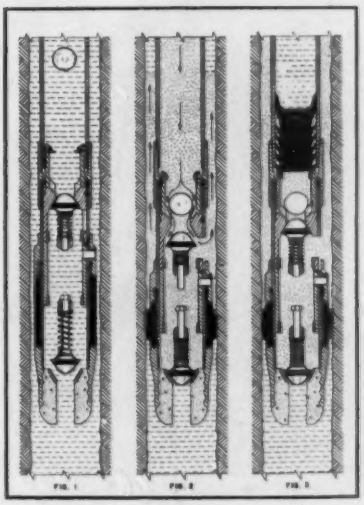
SETTING: Upon reaching the desired depth, the weighted Setting Ball is dropped into the casing and allowed to settle into its seating ring. Applied pump pressure at the point where the ball is seated causes the two internal valve units, inner case and top packer shoe to move down, seating the lower valve and setting the packer. After the packer is set, continued pumping ruptures the seating ring, allowing the ball to drop down to the ribbed supports above the upper valve.

CEMENTING: Movement of the inner case and packer downward opens slotted cementing ports in the side of the tool. Passage of cement through these ports fills the annular space outside the casing from the top of the packer rubber up to the selected point in the hole. A top cementing plug is inserted to complete the job by helping displace the cement inside the casing down to the top of the tool.



Going In Hole | Job In Progress | Job Completed

FORMATION PACKER SHOE

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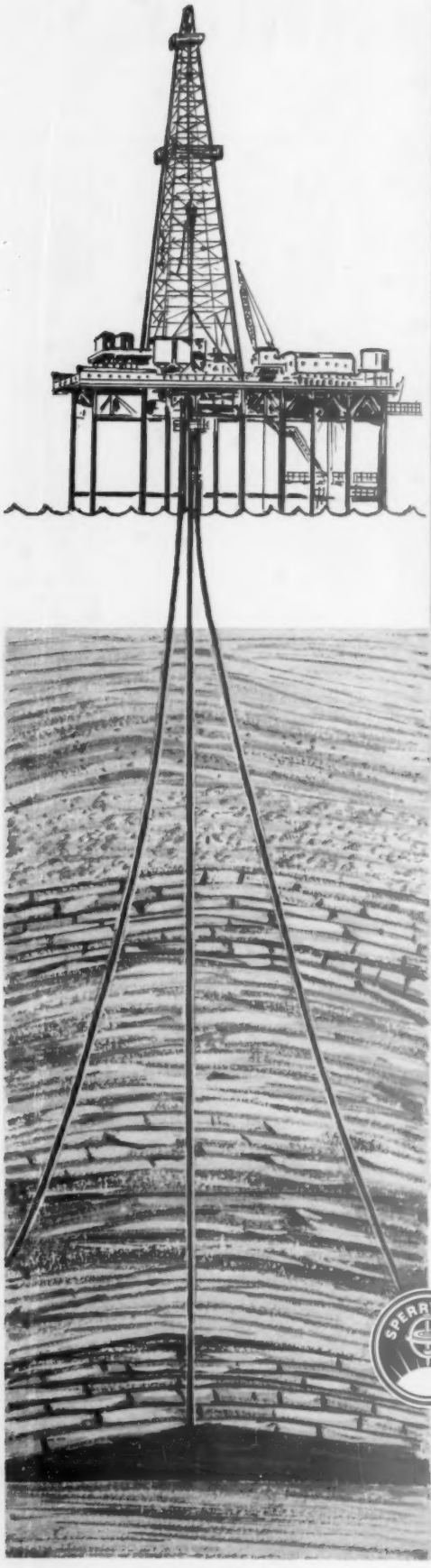

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Know-how by Dow... chromatography by Beckman. Beckman gas chromatography analyzers have been making intermediate and end-product analyses of the ethylene process at the Dow Chemical plant, Bay City, Michigan, since 1959. Beckman process chromatographs permit Dow to produce more ethylene, polyethylene, ethyl benzene, and ethyl benzene derivatives at reduced cost and at a consistently high purity level. ⌘ The four Beckman analyzers were chosen by Dow because of their rapid response, efficient analysis performance, reliability of operation, and minimum maintenance requirements. Two are located on distillation towers; another measures the effluent of the catalytic purification unit; the fourth is placed in the ethylene product stream to measure purity of end product. Precise parameter adjustments are made possible by 12 product readings taken from recorders located in a central operations building. ⌘ For more details on Beckman process gas chromatography write for Data File 24-5-07.

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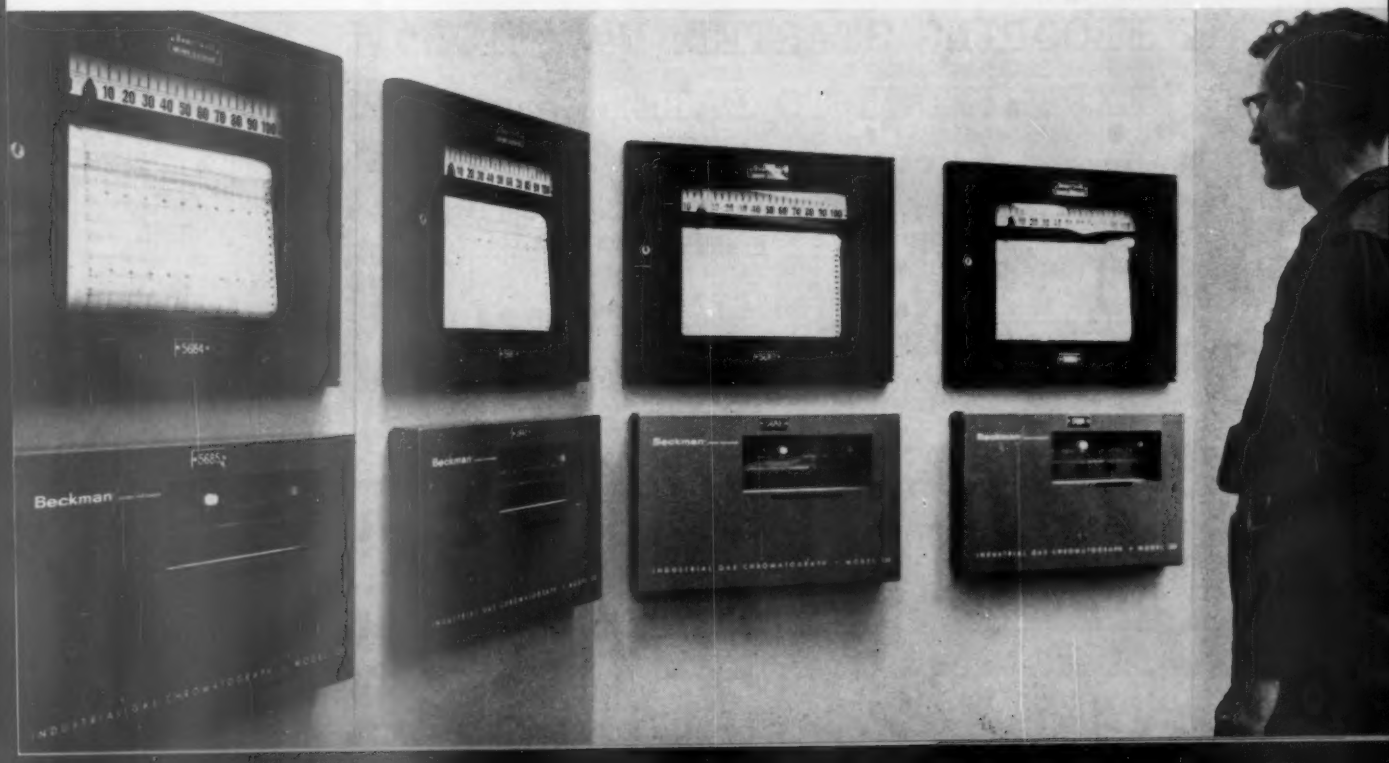
Scientific and Process Instruments Division
Beckman Instruments, Inc.
Fullerton, California



FIELD REPORT

FLOOD: New Harmony Unit

OPERATOR: Superior Oil Company

PUMPS: 4 Aldrich Quintuplex

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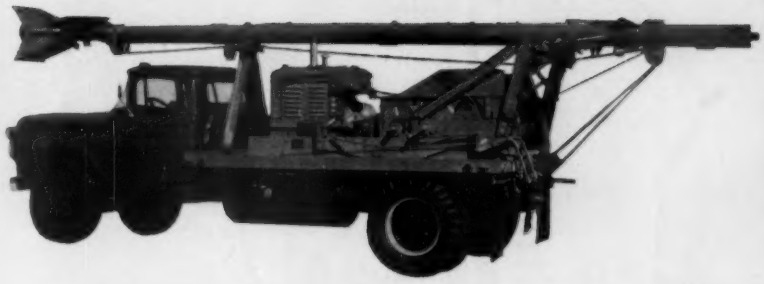
MODEL G-149 SKID WINCH FOR SERVICING TO 3000′ OF 2″ TUBING.

New field developed design is combined with high strength materials in a machine which can be transported over bad terrain with a small truck.

Sells at a price which makes it practical, for servicing marginal wells.

You don't pay extra for eight line speeds, vacuum actuated positive drum clutches, controls positioned at fingertips of operator, or sealed bearings at most points which eliminates lubricating them for their life, because all these features are standard.



FOR EVERY JOB...NO MATTER

MODEL G-226 SKID WINCH FOR SERVICING TO 4000′ OF 2½″ TUBING.

Weighs hundreds of pounds less, but has the power, brakes and line pull flexibility through the standard 8 speeds to give top performance for swabbing, bailing or pulling rods and tubing on wells which formerly required a heavy machine on a large cumbersome truck for transportation.

Simplified operation requires much less effort by the operator and crew to do the job.

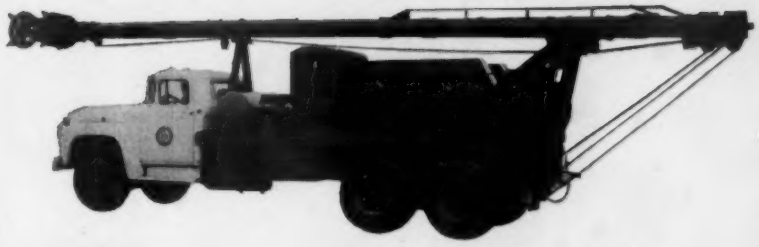
WHAT THE SIZE...OR WHERE IT IS

MODEL P-32 SKID WINCH FOR SERVICING TO 6000′ OF 2½″ TUBING. POWERED BY GASOLINE, L.P.G. OR DIESEL ENGINES UP TO 150 H.P.

Another in the complete range of machines built by Cooper to fit the job without compromise in performance or unnecessary equipment cost.

Complete selection of auxiliary equipment engineered for the machine.

Available are: Pipe masts, derricks, rotary drives, spudding equipment, catheads, catline guides, dividers, line guide shells.



YOU'LL FIND THE BEST EQUIPMENT AT

OTHER COOPER WELL SERVICE MACHINES IN LARGER SIZES ARE BUILT WITH:

Hydraulic drives — air friction clutches — trailer mounted — self propelled and various designs for marine operations.

Tell us your needs — We have the right machine.

FRED E. Cooper, Inc.

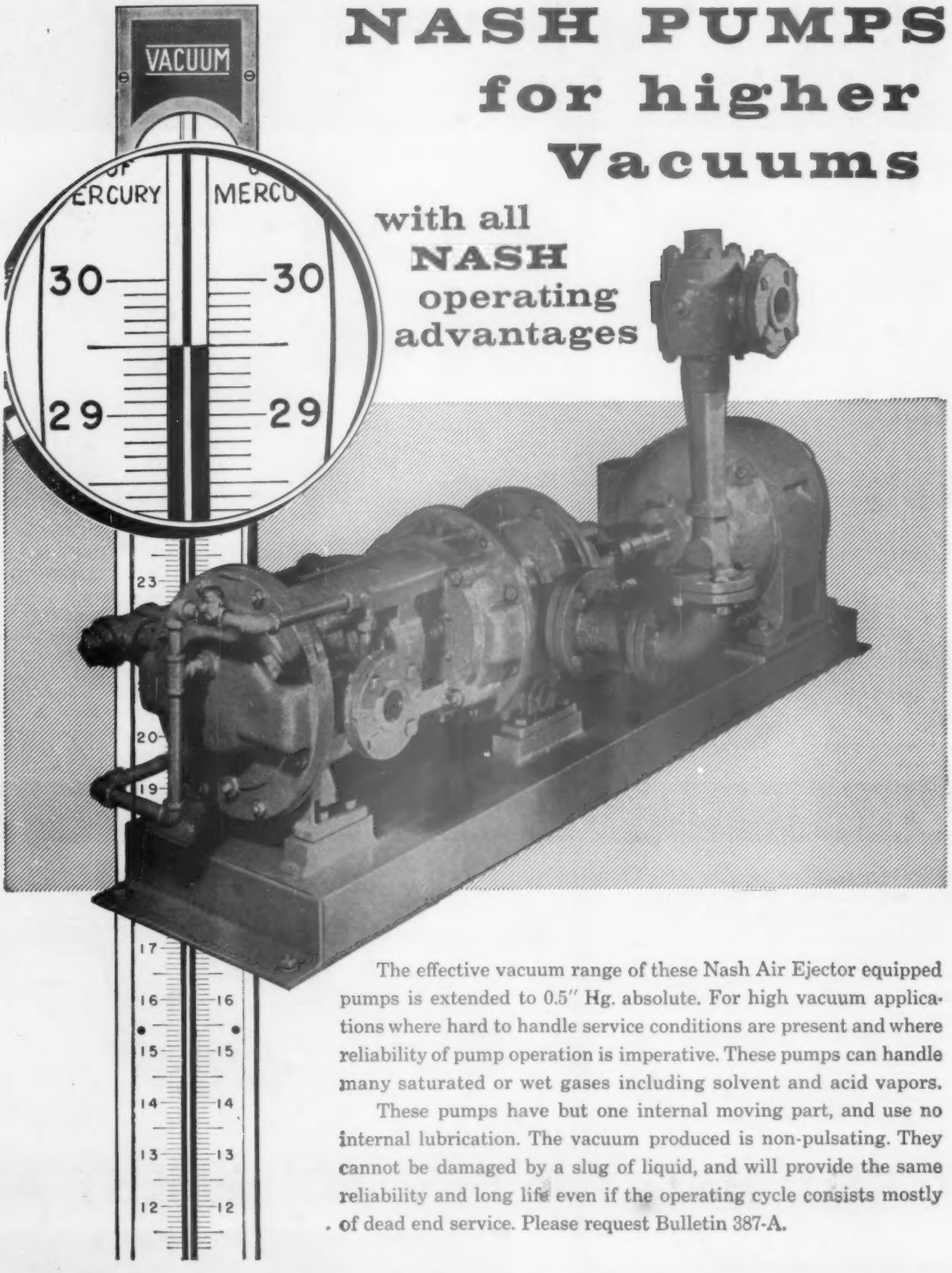
P. O. BOX 1890 TULSA, OKLA.

Branches: Houston, Odessa, Olney

ORIGINATOR OF MOBILE WINCH UNITS

NASH PUMPS for higher Vacuums

with all NASH operating advantages

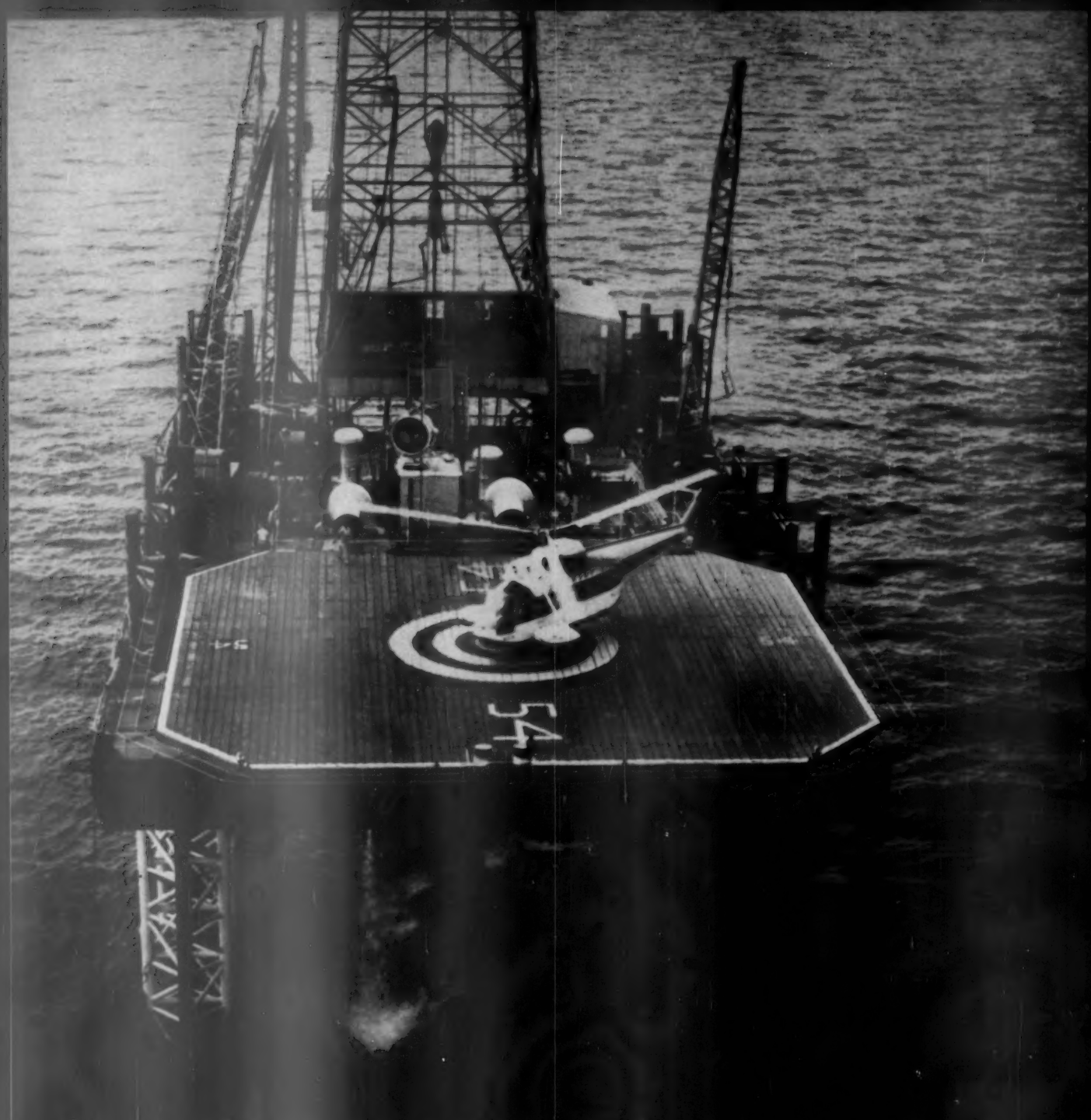


The effective vacuum range of these Nash Air Ejector equipped pumps is extended to 0.5" Hg. absolute. For high vacuum applications where hard to handle service conditions are present and where reliability of pump operation is imperative. These pumps can handle many saturated or wet gases including solvent and acid vapors.

These pumps have but one internal moving part, and use no internal lubrication. The vacuum produced is non-pulsating. They cannot be damaged by a slug of liquid, and will provide the same reliability and long life even if the operating cycle consists mostly of dead end service. Please request Bulletin 387-A.

NASH ENGINEERING COMPANY

SOUTH NORWALK, CONNECTICUT, U. S. A.



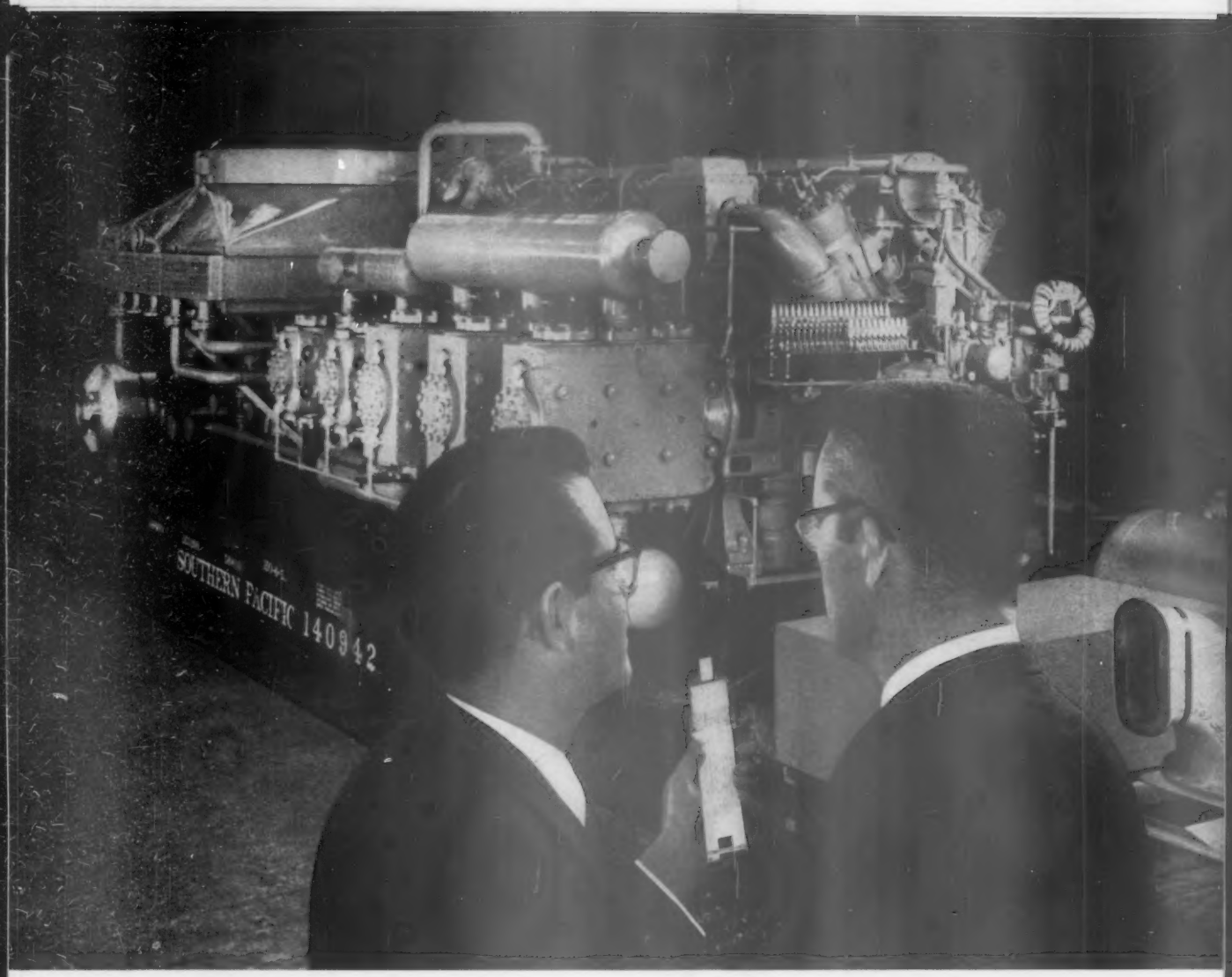
TURBOCOPTERS COME TO THE GULF

The turbine powered flying "crew boat" you see above is a Sikorsky S-62 operated by Petroleum Helicopters, Inc. in the Gulf of Mexico. First helicopter to offer the over-water safety of a boat hull, the S-62 operates equally well from land or drill rig. Its smooth, quiet turbine engine offers passenger comfort, speed and reliability never before available. It flies an 11-man crew change 75 miles out to sea—once a 12-hour boat trip—in just 40 minutes. Crews arrive at the rig fresh, relaxed, ready for work. The S-62 cruises at 100 miles per hour. . . flies close to three hours without refueling. Learn more about the remarkable economies and operating features of the boat-hulled Sikorsky S-62. A note on your letterhead will bring you complete information.

UNITED AIRCRAFT CORPORATION

SIKORSKY AIRCRAFT DIVISION

Stratford, Connecticut



How C-B/S Compressor Designs Solve Your Problems in Gas Gathering

Whether your problem revolves around fine compressor balance for barge-mounted operations, remote control or split gas streams, C-B/Southern people understand your needs. Their application experience is coupled with actual oil and gas producing background. That is why they can provide you with on-the-spot suggestions to economically solve your toughest gas gathering problem. This background is enhanced by company knowledge gained in building more than 40,000 compressor horsepower last year.

C-B/Southern's experience extends through Design, Engineering and Manufacturing Departments. It reaches all the way to future service from 22 Cooper-Bessemer service offices.

A point worth remembering: C-B/S packaged compressor plants are available in horsepower ratings from 100 to 1440; unitized compressors, both reciprocating and centrifugal, to 10,500 horsepower.

CB/S
PACKAGED
COMPRESSORS

CB/S

C-B/Southern, P. O. Box 19267, Houston 24, Texas • HOmestead 8-5441

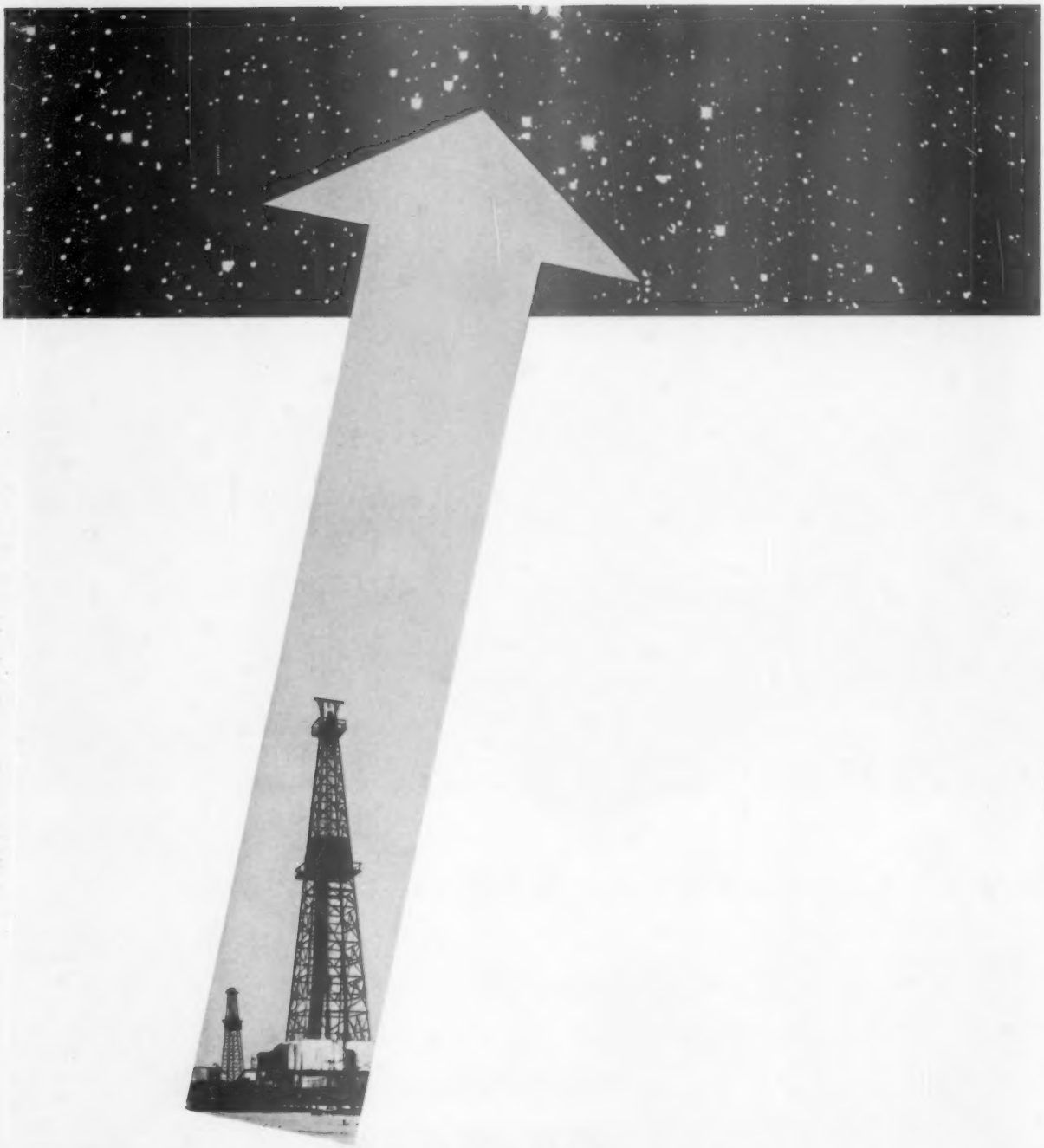
A division of The Cooper-Bessemer Corporation

MANUFACTURERS OF PACKAGED COMPRESSOR PLANTS FOR GAS GATHERING, GAS LIFT, GAS INJECTION APPLICATIONS

FOR EVERY PRACTICAL PURPOSE, this is the best swivel joint in the world. Its design basis is not the product of a limited applicability device, but rather of studied consideration for all applications. It is built to do the best job, with the least maintenance, for the longest period of time. It is a **CHIKSAN** Swivel Joint.

fmc

CHIKSAN COMPANY—General Offices: Brea, California • Well Equipment Mfg. Corp. Division (Weco Unions, Hamer Valves) • Chiksan International • Chiksan of Canada Ltd.
Offices and Representatives in Principal Cities of the World

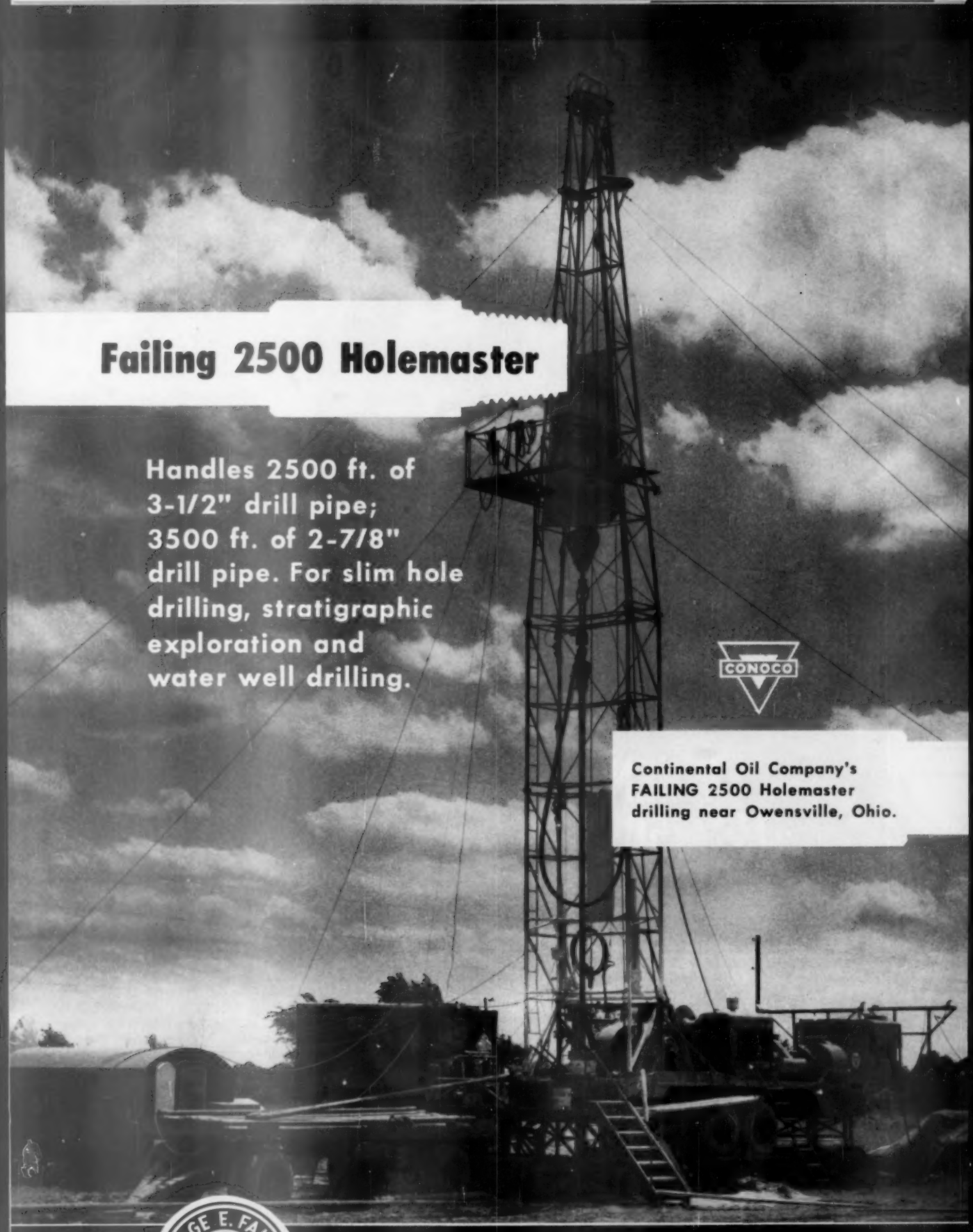


"Petrochemical research is making vital contributions to national defense and the conquest of space. At Esso Research scientists have been at work on the synthesis of compounds that will provide high-energy propellants for missiles and space vehicles. Starting with petroleum-derived hydrocarbons, as well as other compounds of the lighter elements, they are creating new propellant ingredients that will yield a greater thrust per pound."

— M. J. Rathbone, President

Standard Oil Company (New Jersey)

(PRINCIPAL U.S. OPERATING AFFILIATE: HUMBLE OIL & REFINING COMPANY)

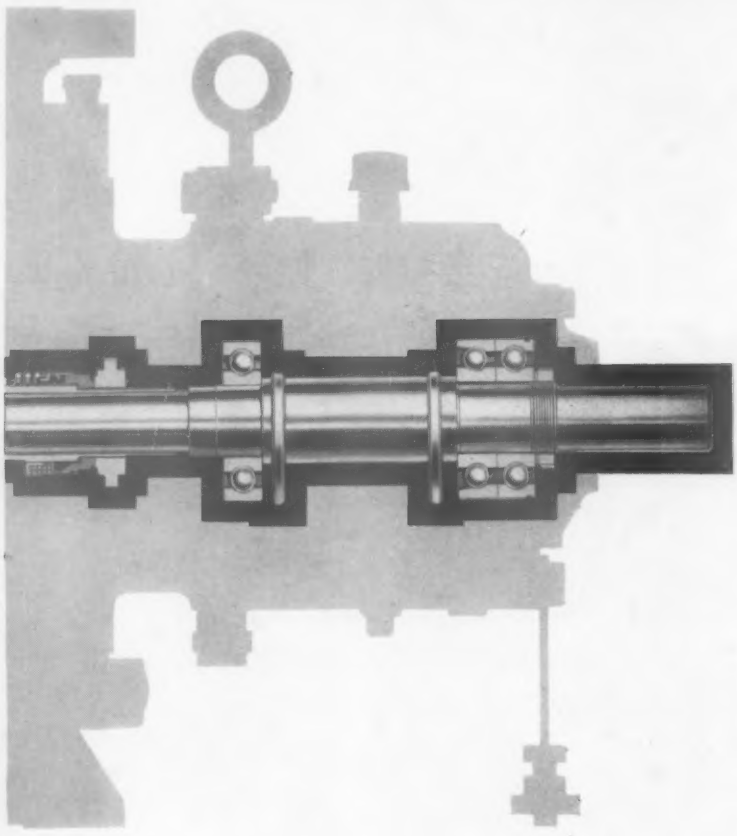

Failing 2500 Holemaster
Handles 2500 ft. of 3-1/2" drill pipe; 3500 ft. of 2-7/8" drill pipe. For slim hole drilling, stratigraphic exploration and water well drilling.
CONOCO
Continental Oil Company's FAILING 2500 Holemaster drilling near Owensville, Ohio.

GEORGE E. FAILING COMPANY

GEORGE E. Failing® COMPANY

A SUBSIDIARY OF WESTINGHOUSE AIR BRAKE COMPANY

ENID, OKLAHOMA, U. S. A.



...IT'S ONLY 250° HERE

intermediate-range pump HANDLES BIG, HOT JOBS

Now you can pump liquids *as hot as 750°F*—and handle pressures to 600 psi—with a pump that costs little more than a light-duty unit.

Goulds Model 3775 petroleum process pump can save you buying much heavier, costlier pumps for these jobs. It pumps 1200 gpm. And it is the only pump designed around a mechanical seal that gives you *both* high-temperature operation and easy upkeep of back pull-out.

Hot pumpage flowing through this pump never touches the mechanical seal—because the seal is isolated in its chamber and surrounded by cool, dead-ended liquid. Coolant circulates through jacket to hold seal face to 250°, even with pumpage at 750°. External flush or heat exchanger cooling is possible, too.

The seal is the *heart* of the pump, not an accessory. Because the pump is designed around the seal, it makes full use of seal advantages. Model 3775 has the lowest overhang ratio of any pump operating above 300°F. Its short shaft helps insure a true-running, long-lived seal.

Mechanically rugged, it is built to API 610 specs; centerline mounted with a vertically split casing. Typical of its quality is the dowel-pin fit alignment of bearing housing and casing cover, which assures perfect alignment and part replaceability.

To see where this cost-cutting pump can fit into your operations, send for our Bulletin 724-1. It gives specifications, construction details, pressure-temperature chart, and other helpful information.

Goulds Pumps Inc., Dept. OGJ-11, Seneca Falls, N. Y.

GOULDS PUMPS

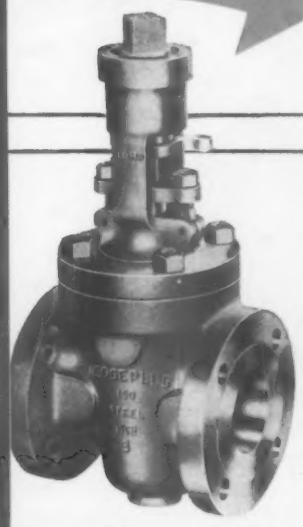
STOCKHAM'S NEW, NON-LUBRICATED, VAPOR-TIGHT WEDGEPLUG "O-SEAL" VALVE . . .

DOES THE WORK OF 2 VALVES!

Provides Double-Block & Bleed in Most Services

Here's the valve you've been waiting for—Stockham's new Wedgeplug* "O-Seal." It not only solves all your leakage problems for good **without lubrication**—but also does the work of 2 valves or a line blind. That's real economy!

The two Teflon# "O" rings in the plug do the trick—give constant vapor-tight shut-off on both the upstream and downstream seats. And the "O-Seal" is **non-lubricated**—cuts maintenance costs **from now on!**



Because of the double pressure-sealing effect of the "O" rings, the upstream seats as well as the downstream seats of this new valve hold "bubble-tight" against line pressure.

The plug in the bottom boss can be pulled to provide the **tell-tale bleed.** In extensive field and laboratory tests, this valve held bottle-tight on the upstream as well as the downstream seats when the bottom plug was removed. There is absolutely no mixing of products in manifolds.

Thus the "O-Seal" can do the job of two ordinary valves or a line blind in most services.

Your Stockham representative will advise you about the recommended services for the "O-Seal's" double-block and bleed feature.

TELL-TALE BLEED

RECOMMENDED USAGES

Stockham's new "O-Seal" is recommended for all general services—air, gas, water, steam, propane, hydrocarbons, etc., as well as for hard-to-hold services. Recommended for temperatures from minus 300° F. to plus 400° F. and not exceeding 720 psi.

Available in carbon and alloy steels, 2"-12" sizes, 150 and 300 lb. pressures. Three port openings—40%, 70%, full round-wrench, handwheel, gear, and motor operated.

OTHER OUTSTANDING ADVANTAGES — **Non-Lubricated—no costly maintenance necessary • Absolute shut-off that remains permanently "bubble tight" • Quick, easy operation—won't stick—ever • Double Seating for Double Safety—Ground metal-to-metal seat provides shut-off in case fire burns out "O" rings • No Product Contamination - Protected Seats.**

*Patented
#Teflon: Dupont Trademark

STOCKHAM'S NEW WEDGEPLUG "O-SEAL" VALVE

Call your **STOCKHAM** Distributor or Sales Representative for complete details, or write today for the new brochure on the Wedgeplug "O-Seal."

Stockham makes a *better* valve . . . for *every* job

WEDGEPLUG VALVE COMPANY *Division of* →

STOCKHAM VALVES *and* FITTINGS

General Offices and Plant / 4002 North 10th Avenue, Birmingham 2, Alabama

CAST IRON—MALLEABLE PIPE FITTINGS • BRONZE, CAST IRON, DUCTILE IRON, CAST AND FORGED STEEL VALVES

YOU CAN COUNT ON FABRICATION TO

YOUR SPECIFICATION

WITH PETROCHEMICAL PROCESSING EQUIPMENT

AT NEWPORT NEWS

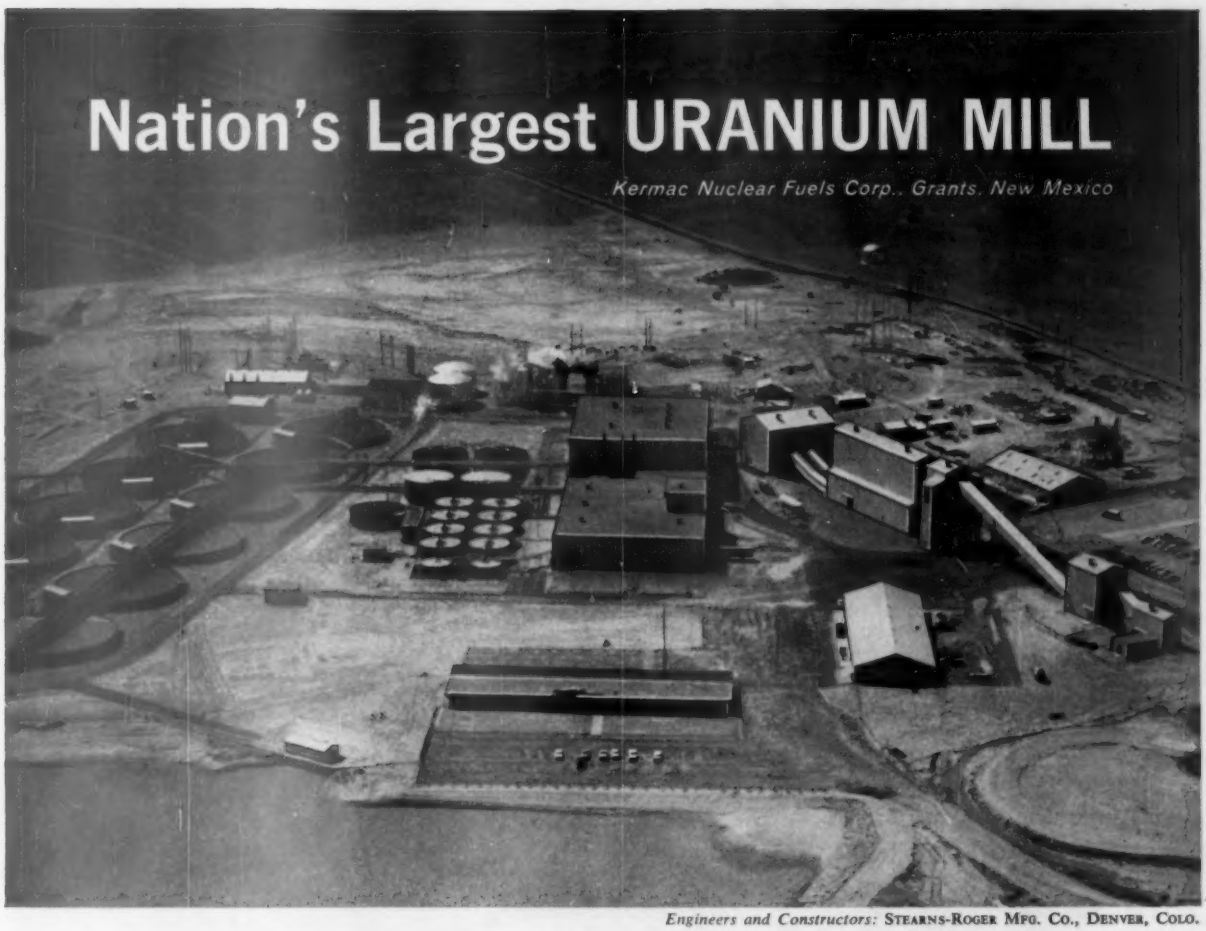
This reactor cap is made of molybdenum plate. Top courses are 1 13/16" thick and the lower courses are 1 9/16" thick.

Newport News is famous for the painstaking care that goes into every step of the fabrication of heavy process equipment for the petrochemical industry.

A separate, fully equipped shop specializes in the production of all types of pressure vessels and process equipment. Rolls, ovens and other machinery can handle plates up to 5 inches thick. Qualified staffs of engineers and technicians backed up by hundreds of skilled workmen use the most advanced techniques to produce vessels to all specifications. The 225-acre Newport News plant also contains a foundry capable of producing individual castings up to 100,000 pounds, forge facilities that can process units weighing as much as 48,000 pounds and machine shops equipped to mill pieces up to 42 feet in diameter.

Use the men, the methods and the machines of Newport News for your next project. Learn how Newport News can produce your needs . . . on time and to specification. Write today!

Newport News
SHIPBUILDING AND DRY DOCK CO.
NEWPORT NEWS, VIRGINIA



Engineers and Constructors: STEARNS-ROGER MFG. CO., DENVER, COLO.

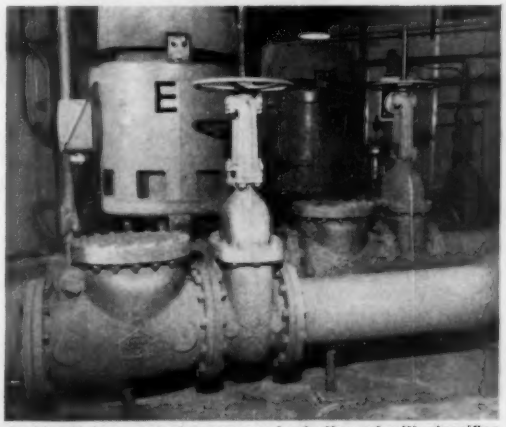
Here, uninterrupted functioning of valves is vital to continuous operation ...so JENKINS VALVES were chosen

This $18,000,000 mill, built in 1958, produces uranium oxide, called yellowcake, from raw uranium ore. Four to five pounds of yellowcake are obtained from a ton of ore by an acid leach, solvent extraction process perfected by Kerr-McGee Oil Industries, Inc. The product is sold under contract to the Atomic Energy Commission.

In the processing, ore and its many derivative components are put through so many washing operations that the mill might be termed the world's biggest "laundry". The valves controlling the use of plant process water are in continuous service.

The chance of valve trouble must be minimized here. It was accomplished by installing JENKINS valves ... chosen on their record of dependable, long-life performance in critical services for almost a century.

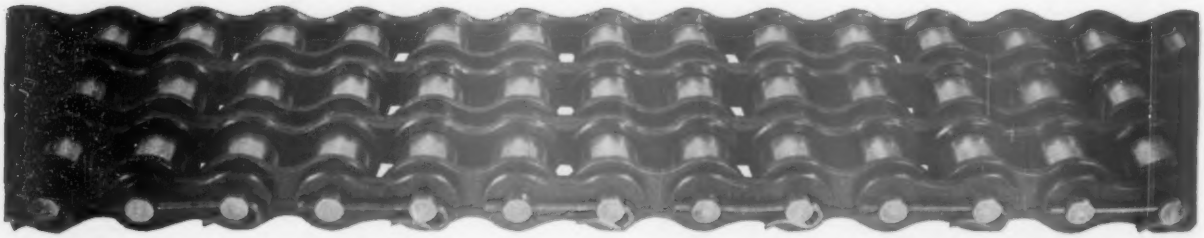
YOU PAY NO MORE when you demand these famous valves for your jobs. And, you gain substantial savings through reduced maintenance and replacement of valves. Jenkins Bros. 100 Park Avenue, New York 17.



Jenkins Valves control process water to the rod mill, classifier sections and the acid plant. Also, lines in power house and heating system.

JENKINS
LOOK FOR THE JENKINS DIAMOND
VALVES
JENKINS SINCE 1864 Jenkins Bros

Sold Through Leading Distributors Everywhere



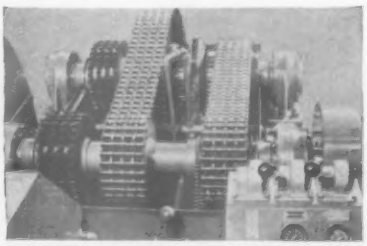
Another of the invisible extras that insure MORE ON-BOTTOM TIME with LINK-BELT FR® roller chain

Cyclic-tension test verifies

top fatigue strength

Fatigue Resistant FR* processing of sidebars lengthens the life-span of Link-Belt roller chain. FR increases chain's endurance limit by compressing the metal around pitch holes . . . the critical sidebar areas most vulnerable to fatigue failure.

On the test equipment above—the industry's largest and fastest fatigue machine—Link-Belt has proved conclusively the superior fatigue resistance imparted to roller chain by the FR process. The machine produces up to 65 tons of cyclic tension. Rapid "stress-on, stress-off" action duplicates toughest conditions of rig operation. From such facilities for research, production and quality control—plus extensive field testing—Link-Belt roller chain inherits invisible extras that withstand the grueling tensions of drilling service.



NATIONAL DUAL-ENGINE INDEPENDENT PUMP DRIVE incorporates quadruple-width Link-Belt Precision Steel roller chain with FR.

For engineering assistance in applying FR roller chain, write Link-Belt Company, Indianapolis 6, Indiana. Ask any leading supply store for our Catalog 2980 containing full information on roller chain and other oil field equipment.

** U.S. Patent No. 2,517,497*

LINK-BELT COMPANY: Indianapolis 6, Houston 1, Dallas 26, Odessa, Tex., New Orleans 16, Shreveport, La., Los Angeles 22 (Montebello), Scarboro (Toronto 13); Export Office, New York 7. Distributors in All Fields. 18,570

LINK-BELT

ROLLER CHAINS AND SPROCKETS

A single power source operates both EOT-Johnston Rod Counter-Balanced units shown pumping these offset wells. Units can be operated economically—efficiently—up to 160-acre spacing.

The new EOT-Johnston Rod Counter-Balanced unit is ideal for multiple completions. Can handle any depth . . . any fluid volume . . . and at considerable savings over conventional beam-type units.

6030

EOT

Rod Counter-Balanced

HYDRAULIC UNIT

Now . . .
Pump TWO WELLS for the Price of ONE!

For the operator who needs economical pumping with efficient operation, the new EOT-Johnston Rod Counter-Balanced Hydraulic Pumping Unit is the answer.

The new EOT-Johnston Rod Counter-Balanced unit can pump multiple completions . . . can pump offset wells up to 160-acre spacing . . . and at a saving up to 50% over conventional beam-type units!

The EOT-Johnston Rod Counter-Balanced unit contains a new design valve . . . a special four-way valve that eliminates charging the hydraulic pump suction. Field performance tests acclaim the EOT-Johnston Rod Counter-Balanced unit an engineering "break-through" for the hydraulic pumping method. Now, the economics of hydraulic pumping can be applied to any well, regardless of depth or volume of fluid to be handled.

Write for complete data on the new EOT-Johnston Counter-Balanced Hydraulic Pumping Unit . . . economical . . . efficient . . . pumps two wells for the price of one.

EOT

ENGINEERED OIL TOOLS, INC.

Branches: Odessa & Pampa, Texas; Oklahoma City, Oklahoma
General Offices: 1710 Burnett, Houston, Texas

Distributors:
EOT-Johnston Hydraulic Pumping Units available through your local supply stores in West Texas and Mid-Continent areas. WEST COAST: Lacy Oil Tool Co.; APPALACHIAN AREA: McJunkin Corp.; CANADA: Canadian Well Services, Ltd.; EXPORT: Wilson Supply Co., International Div.

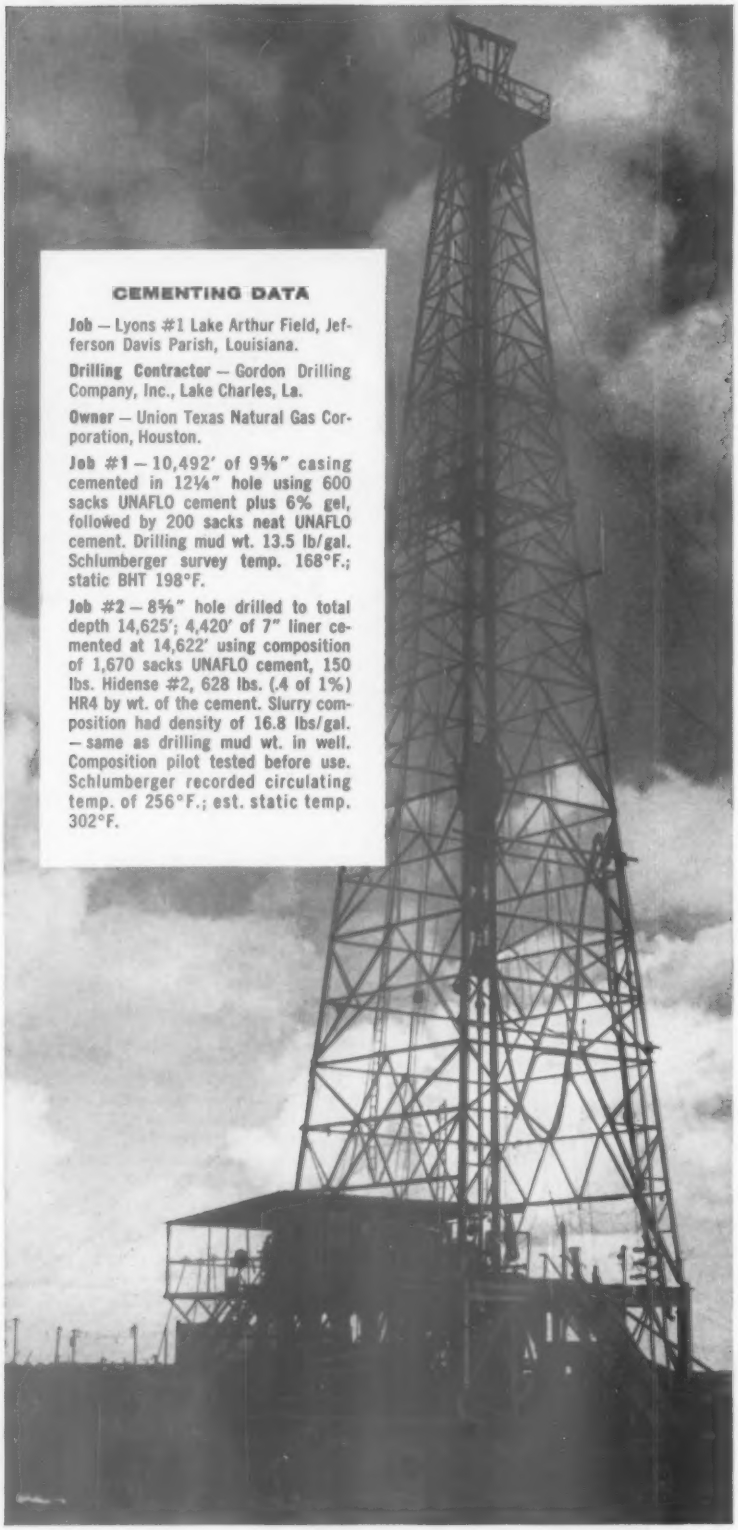
14,625′ down—cemented with success

At all depths, UNAFLO oil-well cement provides a slurry that follows the irregularities of well bore and pipe . . . remains fluid under down-the-well temperatures and pressures . . . stays pumpable after a period of rest . . . is easily reversed out . . . yet sets hard to provide an adequate seal. That's because the retarded set of UNAFLO sustains high initial fluidity. This postponement of initial thickening allows ample time for proper placement plus a margin of safety for delays or emergencies.

For cementing or recementing, for plug-backs or squeezes, at varying depths, pressures and drilling conditions, UNAFLO cement provides the workable slurry — one that pumps easily, sets hard. For more data, write Universal Atlas Cement, 100 Park Avenue, New York 17, N. Y.

"USS" and "Unaflo" are registered trademarks

OFFICES: Albany · Birmingham · Boston · Chicago · Dayton · Kansas City · Milwaukee · Minneapolis · New York · Philadelphia · Pittsburgh · St. Louis · Waco



CEMENTING DATA

Job — Lyons #1 Lake Arthur Field, Jefferson Davis Parish, Louisiana.

Drilling Contractor — Gordon Drilling Company, Inc., Lake Charles, La.

Owner — Union Texas Natural Gas Corporation, Houston.

Job #1 — 10,492′ of 9⅝″ casing cemented in 12¼″ hole using 600 sacks UNAFLO cement plus 6% gel, followed by 200 sacks neat UNAFLO cement. Drilling mud wt. 13.5 lb/gal. Schlumberger survey temp. 168°F.; static BHT 198°F.

Job #2 — 8⅜″ hole drilled to total depth 14,625′; 4,420′ of 7″ liner cemented at 14,622′ using composition of 1,670 sacks UNAFLO cement, 150 lbs. Hidense #2, 628 lbs. (.4 of 1%) HR4 by wt. of the cement. Slurry composition had density of 16.8 lbs/gal. — same as drilling mud wt. in well. Composition pilot tested before use. Schlumberger recorded circulating temp. of 256°F.; est. static temp. 302°F.

U-164

USS **Universal Atlas Cement**
Division of
United States Steel

FOR COMPLETE PROCESS CONTROL SYSTEMS...

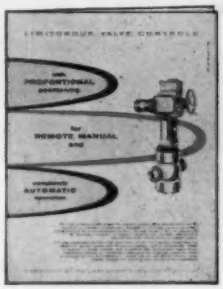
LimiTorque

VALVE OPERATORS

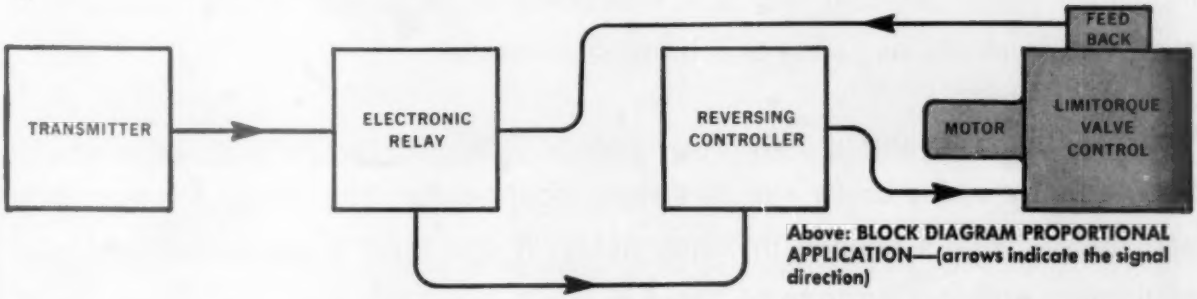
with Proportional Positioning for Remote Manual, and Completely Automatic Operation

The growing demand for complete process control systems to assure the centralization of performance responsibility in a single source, is successfully accomplished by systems employing LimiTorque (some of which are outlined in Bulletin #6-60 offered here). The same dependability and accuracy that has made the name LimiTorque so widely used and favorably known throughout the World on all types of installations, is maintained in these modern all-electric actuator systems.

Full range proportional operation of the final control element from remotely located electronic transmitters, provide answers that the process engineers need, to automatically throttle in response to process variables such as pressure, flow, level, density, weight, thrust, temperature, position, etc. Components employed in the LimiTorque system are chosen for dependability with the elimination of complex circuits and special electrical power supplies. Inquiries are invited to meet the exacting service requirements.



Be sure to send for this New Bulletin 6-60 which fully describes and profusely illustrates LimiTorque with Proportional Positioning accessories.



Above: BLOCK DIAGRAM PROPORTIONAL APPLICATION—(arrows indicate the signal direction)

THERE IS NO SUBSTITUTE FOR —

LimiTorque®

PHILADELPHIA GEAR CORPORATION

KING OF PRUSSIA (SUBURBAN PHILADELPHIA), PA.

Offices in all Principal Cities

INDUSTRIAL GEARS & SPEED REDUCERS • LIMITORQUE VALVE CONTROLS • FLUID AGITATORS • FLEXIBLE COUPLINGS

Limitorque Corporation • King of Prussia, Penna.

What's so special about the huge fractionating tower shown here? It is one more example of how Sun Ship builds and delivers heavy industrial equipment on barges or sea-going vessels, with careful attention to such requirements as safety and on-time schedule.

Whether it's a fractionating tower or key structural part for industry, transporting big items by water or by rail is strictly routine for Sun Ship, for we build and deliver what's needed in many fields. If you have a machinery or heavy equipment problem, write to us about it.

Sun

SHIPBUILDING & DRY DOCK COMPANY

ON THE DELAWARE • SINCE 1916 • CHESTER, PA.

"Matched Tools for Unmatched Performance"

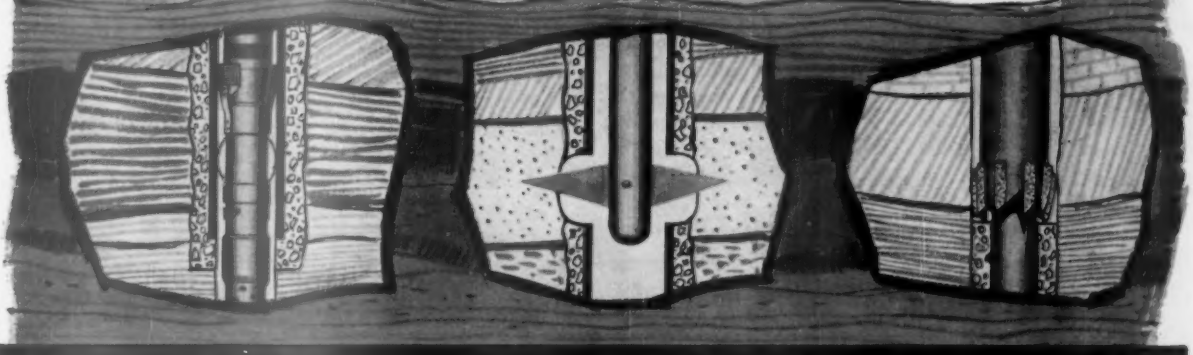
WHAT 42 YEARS OF SERVICE "KNOW-HOW" MEANS TO YOU

Whether your needs call for setting a liner, notching the formation, washing over stuck Drill Collars or any other service job, ***BAASH-ROSS*** service *"know-how"* coupled with top-engineered tools, such as the Power Swivel, means you are assured . . .

- That experienced servicemen will do the job right
- That the job will be done in the shortest time
- That you will realize the maximum in safety, quality and accuracy

These factors total up to the ultimate in *SERVICE PERFORMANCE* which means *SAVINGS* to you.

ONCE USED . . . ALWAYS DEMANDED



OVERSHOT

In addition to extensive service work, Baash-Ross fishing and drilling tools are available for rent. Be ahead by calling us for your Rental or Service needs.

INTERNAL PIPE CUTTER

BAASH-ROSS

DIVISION OF JOY MANUFACTURING COMPANY

General Offices: Houston, Texas

BAASH ROSS DIV

OUR 42d YEAR OF PROGRESS

JOY

Jack Starr, Vice President in Charge of Drilling, Falcon Seaboard Drilling Company, Tulsa, Oklahoma, made the following statement in an interview with Jack Driggs, CF&I Sales Engineer.

Experienced drilling man says:

"DOUBLE GRAY-X® Wire Rope gives extra-long service...that's why we ordered a carload."

"Mr. Starr, your company was one of the first to field test a prototype of CF&I-Wickwire's Double Gray-X. What led to your decision to try this new wire rope?" asked Jack Driggs.

"Falcon Seaboard insists on the best possible products to serve the oil industry in accordance with today's modern standards. As you know, rotary drilling inflicts severe punishment — abrasion, crushing and constant bending — on wire ropes. We had to have an improved wire rope to resist these destructive forces. That's why we were anxious to test CF&I's new rope," replied Mr. Starr.

"How about downtime . . . did your tests show that your equipment can be run for longer stretches with Double Gray-X than with the previous ropes that you used?" inquired Driggs.

"Definitely! That's why we ordered a carload. What's more, we're convinced that Double Gray-X provides extra-high breaking strength. This extra safety factor is extremely important in our drilling operations. Now let me ask you a question."

"Fire away," said Driggs.

"Why does Double Gray-X last longer than other wire ropes?"

"It's because of a new wire drawing process, Mr. Starr. This process, which includes the use of a special lubricant — molybdenum disulphide — builds a permanent molecular shield around each wire in Double Gray-X. This molecular jacket permits friction-free interaction of the individual wires...assures a smoother surface to the wires . . . and provides extra toughness . . . all factors leading to longer rope life."

"Thanks, Jack, for the information. And thanks to CF&I for the fine service you people give us," commented Mr. Starr.

Made in a wide variety of sizes and constructions, Double Gray-X is recommended for many drilling applications. Find out for yourself how this new wire rope can give you increased operating economy; call the nearest CF&I office or your Wickwire Rope distributor.

WICKWIRE ROPE
DOUBLE GRAY-X
DOUBLE GRAY-X
A CF&I PRODUCT

WICKWIRE ROPE

THE COLORADO FUEL AND IRON CORPORATION

In the West: THE COLORADO FUEL AND IRON CORPORATION — Albuquerque • Amarillo • Billings • Boise • Butte Denver • El Paso • Farmington (N. M.) • Ft. Worth • Fresno • Houston • Kansas City • Lincoln • Los Angeles • Oakland Odessa (Tex.) • Oklahoma City • Phoenix • Portland • Pueblo • Sacramento • Salt Lake City • San Francisco San Leandro • Seattle • Spokane • Tulsa • Wichita

In the East: WICKWIRE SPENCER STEEL DIVISION — Boston • Buffalo • Chattanooga • Chicago • Detroit Emlenton (Pa.) • New Orleans • New York • Philadelphia

7931

CF&I STEEL

JUST LIKE MONEY IN THE BANK

Save as you store volatile liquids in General American conservation structures

General American fabricates tanks with every type of floating roof, tanks with lifter roofs, dry-seal gasholders and vapor balancers that will pay for themselves with the product they save.

Two outstanding seals—the Wiggins Safety Seal, safest, surest seal you can buy, and EverSeal, a solid cushion seal especially made for "problem" liquids — are offered with the floating roofs.

Skilled field crews of General American and subsidiaries are available to erect these structures where you require them.

Write for General American Bulletin No. PW-1059 for descriptive details.

General American Floating Roofs
Hidek
Lodek
Double Deck
Annular Pontoon
Pan

General American Floating Roof Seals
Wiggins Safety Seal
EverSeal

Other conservation structures
Lifter Roof Tanks
Dry Seal Gasholder
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World's Finest Oil Field Power
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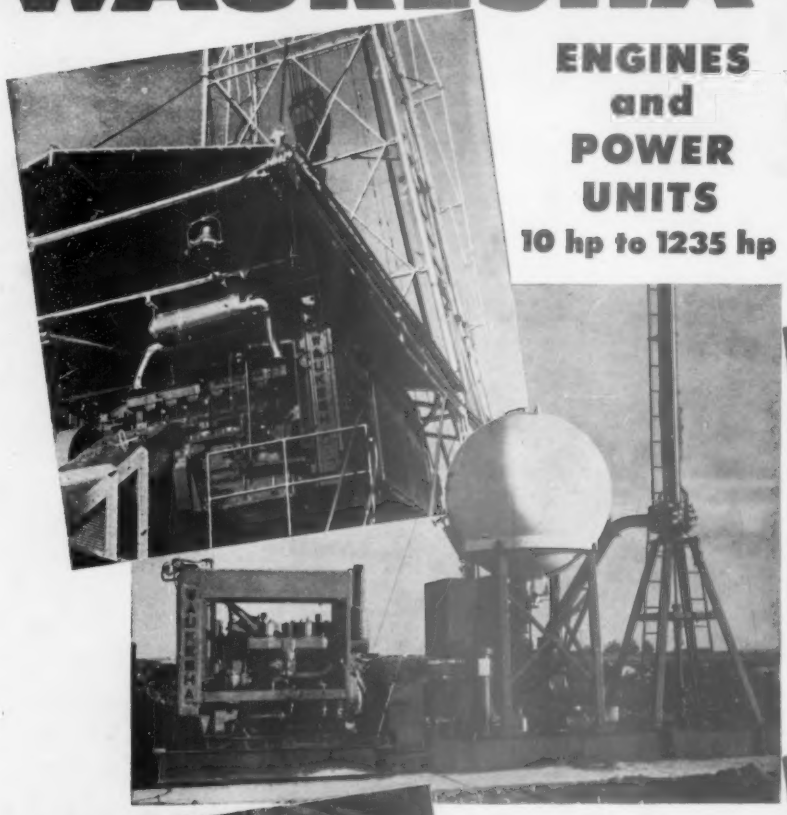
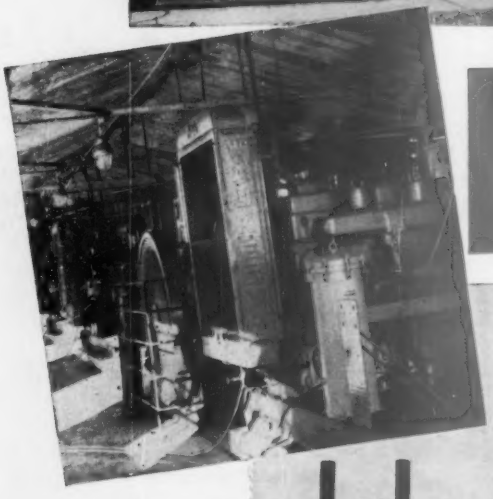
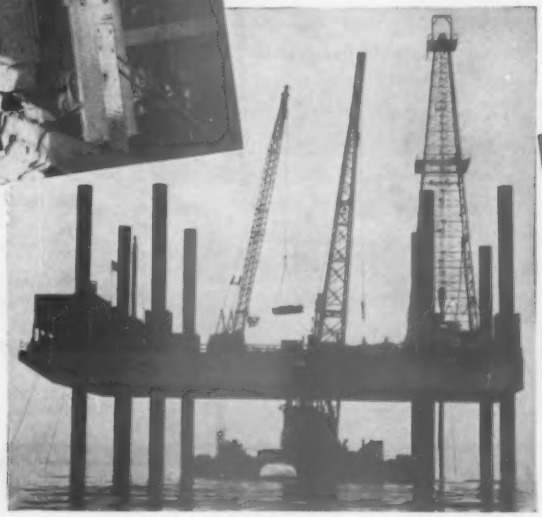
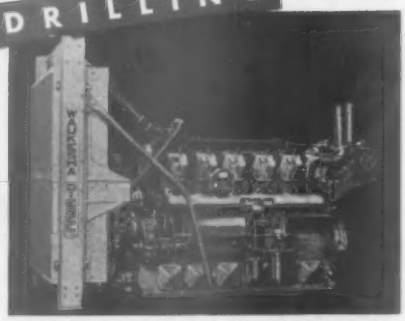
ENGINES and POWER UNITS
10 hp to 1235 hp







DRILLING

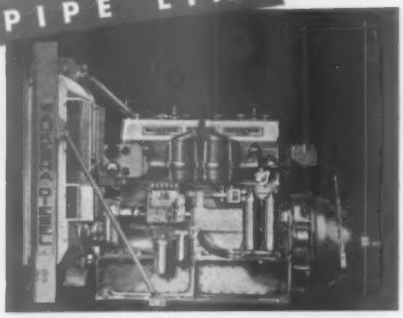


VLRDBSU Turbocharged Diesel Unit—twelve cyl., 8½-in. bore x 8½-in. stroke, 5788 cu. in. displacement, 1190 hp at 1200 rpm.

PUMPING

WAKCU Special Long Life Unit—six cyl., 6¼-in. bore x 6½-in. stroke, 1197 cu. in., up to 142 continuous (65%) hp at 1200 rpm.

PIPE LINE



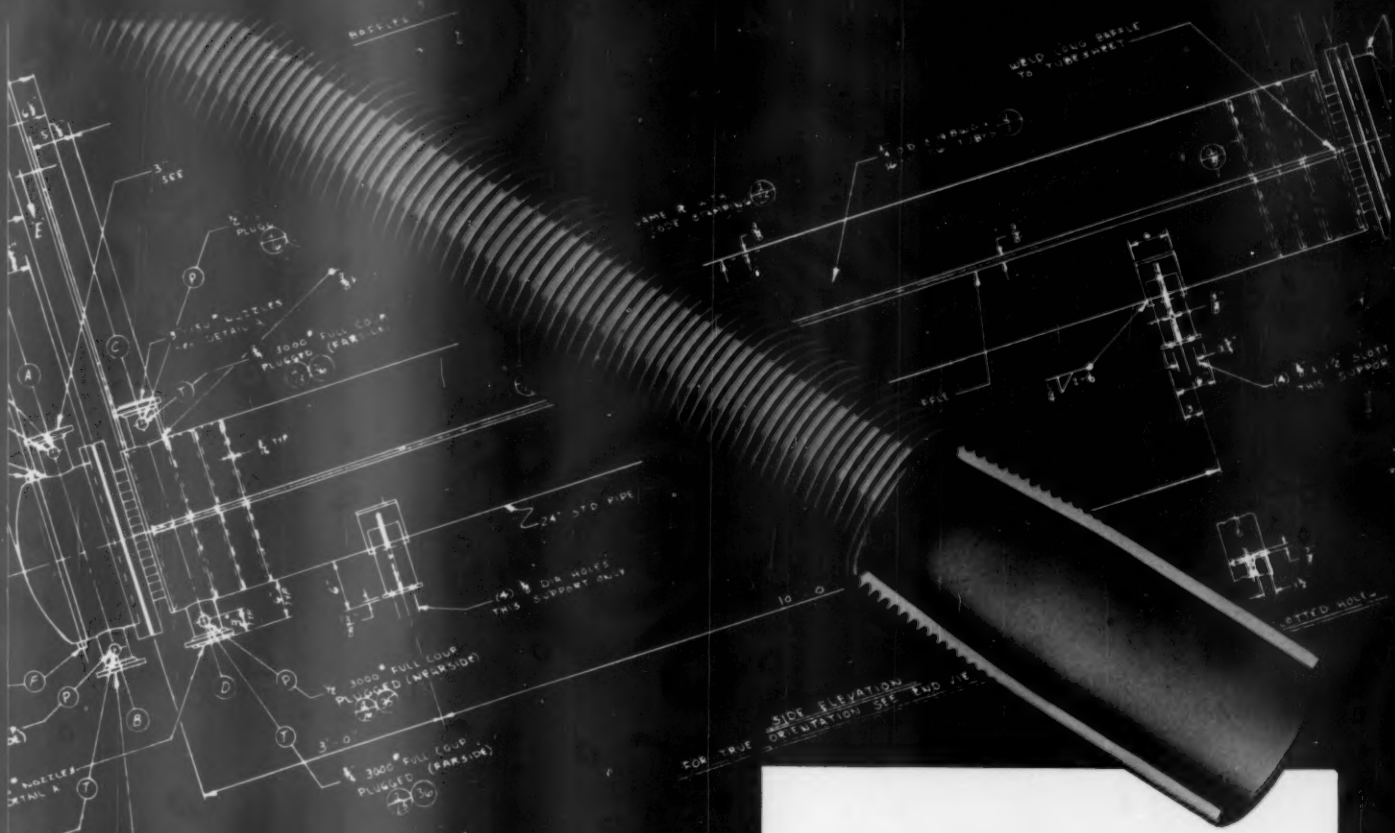
NKDBU Normal Diesel Power Unit—six cyl., 7-in. bore x 8¼-in. stroke, 1905 cu. in., 270 hp at 1200 rpm, (to 360 hp turbocharged).

OFFSHORE

VLRD Series Diesel Enginator—twelve cyl., 8½-in. x 8½-in., 5788 cu. in. engine direct connected to heavy duty AC Alternator—up to 800 KW.

WAUKESHA
MOTOR COMPANY
WAUKESHA, WISCONSIN
New York • Tulsa
Huntington Park, Calif.

362-R-2



Wolverine TRUFIN® and STEEL ...go together—naturally!

Where corrosion is not a problem—design and operating engineers are finding that they can cash in on money-saving benefits by specifying Wolverine Trufin Type S/T (19 fins per inch) in seamless steel.

Trufin – in steel – possesses all of the inherent advantages of integral finned tube. For example:

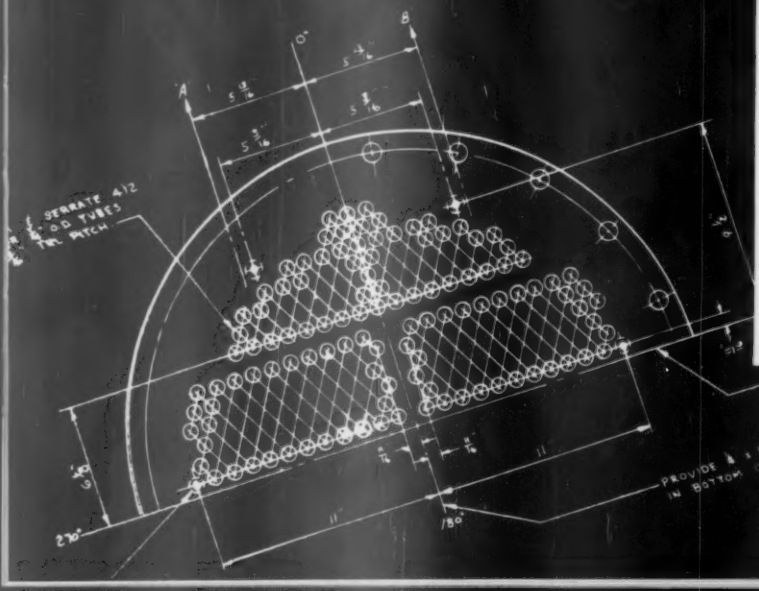
* **In new installations** – Trufin lets you design smaller exchangers without sacrificing capacity. You save on shells, headers, baffles, supports, etc.

* **When retubing** – Trufin's extended surface makes it possible to dramatically increase the capacity of existing exchangers. Trufin Type S/T can be substituted directly for bare tube.

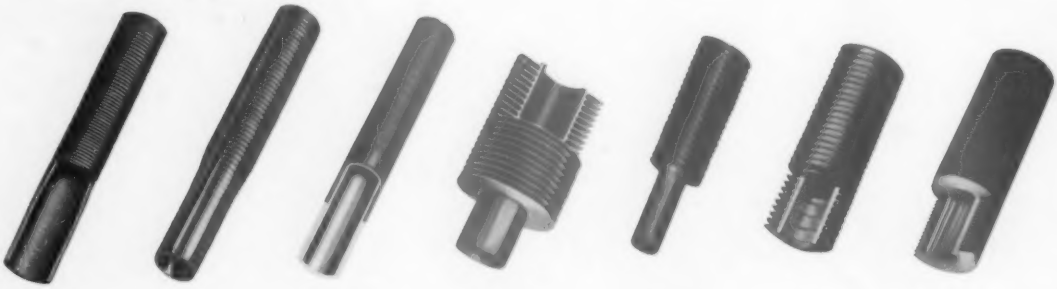
* **Trufin has stamina** – Trufin, because of its integral fins, has the ability to stand up under rigorous operating conditions. Fins are part of the tube wall and are unaffected by the pounding of temperature and pressure changes and vibrations.

Trufin is produced in many types, sizes, and fin spacings – and in steel, copper, copper alloys and aluminum.

WRITE TODAY FOR MORE INFORMATION.



Look to Wolverine for the complete line of finned tube

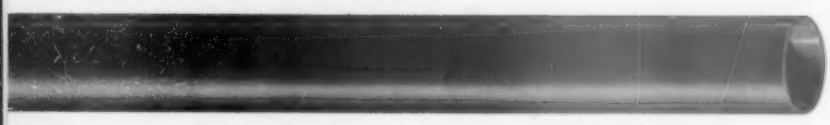


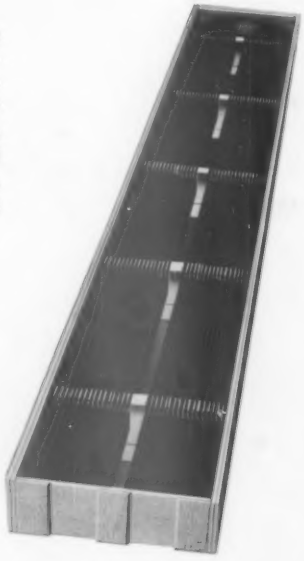
Trufin Type S/T | Trufin Type W/H | Trufin Type S/T (Duplex) | Trufin Type L/C (Bimetal) | Trufin Type H/R | Trufin Type H/A | Trufin Type I/L

Only Wolverine Tube Division of Calumet & Hecla, Inc. can supply you with such a complete line of integrally finned tube – seven different types designed to bring increased efficiency to a wide variety of heat transfer applications. Each type is available in a complete range of sizes and alloys. Ask your Wolverine salesman for information about how these outstanding tubes can help you.

WOLVERINE ALSO OFFERS SPECIAL SERVICES AND SPECIAL PRODUCTS

Wolverine's Field Engineering Service is staffed with specialists trained in tubing selection, alloys, metallurgy, equipment design, etc. Also available for consultation are Wolverine's Heat Transfer Specialists who are located throughout the major processing areas. The services of all these men are yours —without obligation.





. . . AND, OF COURSE, WOLVERINE TUBE also manufactures a complete line of copper, copper alloy and aluminum prime surface condenser tube. Ask your Wolverine sales representative about Wolverine's complete line of products and services.

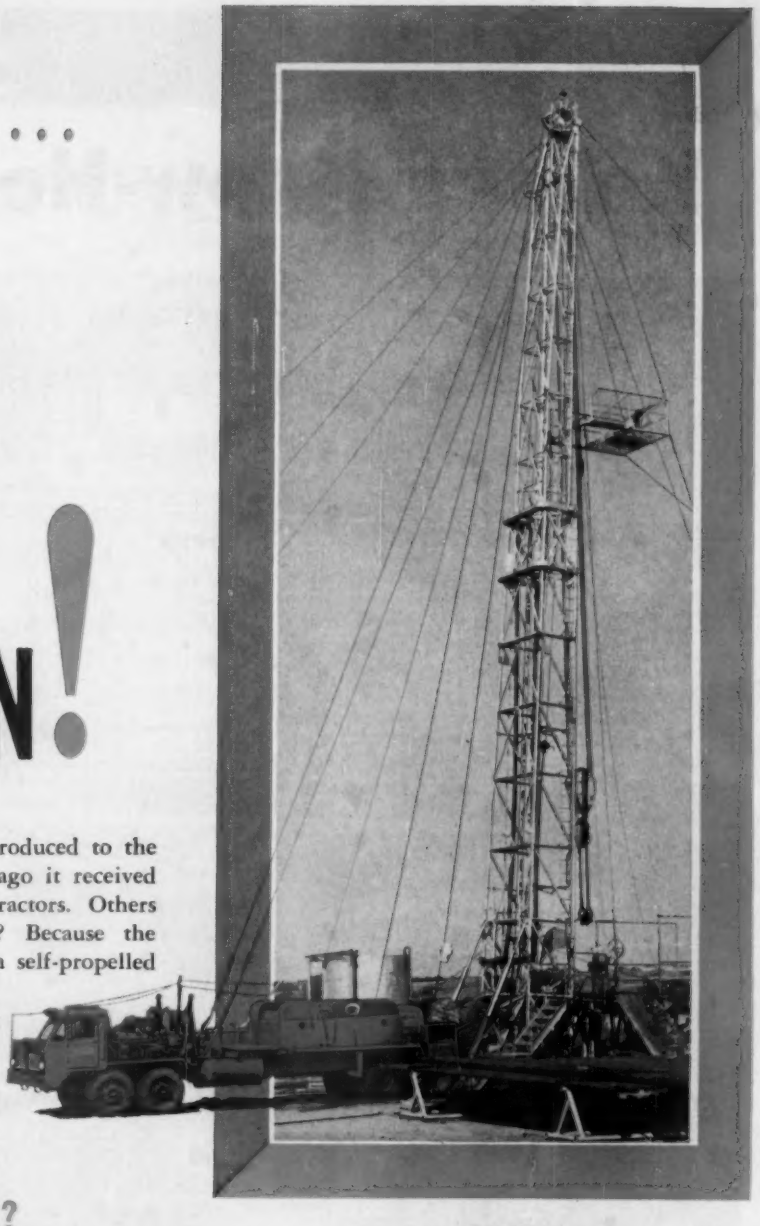
Wolverine Tube is also a prime mill source for palletized U-bend condenser tubes—manufactures them to your "specs" and ships them to you in disposable box-type pallets so that you can feed directly from pallet to condenser.

WOLVERINE TUBE
DIVISION OF
Calumet & Hecla, Inc.
DEPT. I, 17238 SOUTHFIELD RD., ALLEN PARK, MICH.
Manufacturers of Quality-Controlled Tubing

PLANTS IN DETROIT, MICHIGAN AND DECATUR, ALABAMA. SALES OFFICES IN PRINCIPAL CITIES

Franks Explorer....

NOW FULLY FIELD PROVEN!



When the Franks Explorer was first introduced to the well servicing industry some two years ago it received immediate acceptance from many contractors. Others assumed a wait-and-see attitude. Why? Because the Explorer was a totally new concept — a self-propelled unit primarily designed as a servicing and workover rig, and mounted on a rugged carrier for secondarily designed to over the road travel. Here was the promise of new speed, more horsepower, greater flexibility. The "wait-and-see" groups settled back to watch.

AND WHAT DID THEY SEE?

Within two short years they saw the Franks Explorer outsell all competition. They saw themselves joining that first group of contractors who accepted the Explorer immediately — who knew Franks' reputation for building good equipment and for delivering what is promised.

If you're still from Missouri, ask the man who owns a Franks' Explorer. Or, better still, call your Franks' representative for all the details.

WELL SERVICING AND DRILLING UNITS

FRANKS

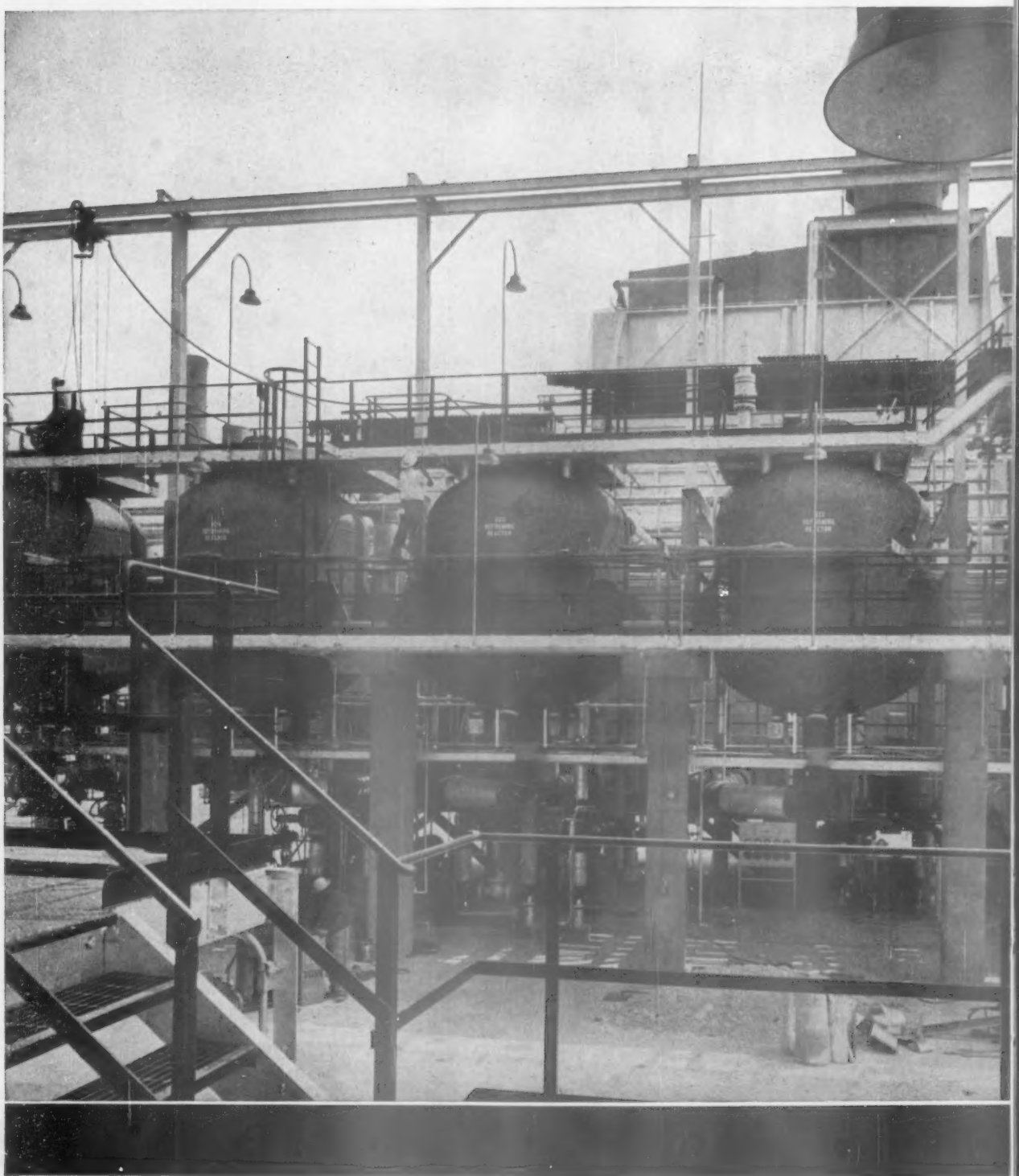
PAMPA, TEXAS

CABOT

CABOT CORPORATION
MACHINERY DIVISION

Worth more when you BUY 'EM . . . Worth more when you TRADE 'EM

Kellogg Know-How Optimizes



Investment in Cat Reforming

WORLD-WIDE RANGE OF INSTALLATIONS SHOWS FLEXIBILITY OF KELLOGG ENGINEERING-CONSTRUCTION SERVICES

To improve octane rating or to meet increased demands for petrochemicals, Kellogg is uniquely equipped to design or erect catalytic reformers to meet any specific need. Combined with Kellogg-designed hydrotreating facilities, cat reforming produces high octane gasoline of superior quality. The reformate is also a rich source of aromatics for petrochemical production.

Feedstocks reformed include light, heavy, and full-boiling virgin naphthas as well as thermally and catalytically cracked stocks which have been selectively pretreated. Products include aromatics such as benzene, toluene, and xylenes plus isobutane and hydrogen.

For further information on how Kellogg can optimize your investment in cat reforming, you are invited to send for an 8-page folder—"Regenerative Catalytic Reforming".

THE M. W. KELLOGG COMPANY

711 Third Avenue, New York

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KELLOGG

KELLOGG CAT REFORMING EXPERIENCE

Heath, Ohio	3,000 BPD
Houston, Texas	24,000 BPD
Bakersfield, California	4,000 BPD
Grand Prairie, Alberta	875 BPD
Antwerp, Belgium	2,500 BPD
Toledo, Ohio	12,000 BPD
Ponca City, Oklahoma	11,000 BPD
Lemont, Illinois	12,000 BPD
Vancouver, B.C.	4,000 BPD
Denver, Colorado	3,800 BPD
Montevideo, Uruguay	3,000 BPD
Concon, Chile	6,000 BPD
Kent, England	10,000 BPD
Dunkerque, France	10,000 BPD
Kwinana, Australia	10,000 BPD
Antwerp, Belgium	10,000 BPD
El Palito, Venezuela	6,500 BPD
Fremantle, W. Australia	6,000 BPD
Amarillo, Texas	5,000 BPD
Dinslaken, Germany	12,500 BPD
Izmit, Turkey	2,500 BPD*
Karachi, Pakistan	2,250 BPD*
Texas City, Texas	22,300 BPD
Wood River, Illinois	9,000 BPD
Baytown, Texas	20,000 BPD
Pointe aux Trembles, Quebec	4,500 BPD
Texas City, Texas	7,500 BPD
Ponca City, Oklahoma	3,850 BPD
Baytown, Texas	16,500 BPD
Oleum, California	8,000 BPD
Lockport, Illinois	7,500 BPD
Whiting, Indiana	9,250 BPD
Toledo, Ohio	5,500 BPD
Buenos Aires, Argentina	740 BPD
Destrehan, Louisiana	2,000 BPD
East Chicago, Indiana	12,780 BPD
Lake Charles, Louisiana	17,250 BPD
Whiting, Indiana	30,000 BPD
West Tulsa, Oklahoma	7,500 BPD
Regina, Saskatchewan	3,000 BPD
TOTAL	348,095 BPD

**Future*

KEEP MOVING... SWAMP

Sure-footed flotation saves you in soft going. Power and balance keep you rolling on steep slopes. All along the line you get money-making performance from Allis-Chalmers side boom tractors.

Allis-Chalmers' big side boom tractors have a *reputation* among pipeliners for walking right through gooey swamps that are out of bounds for other pipe layers. Long, wide tracks stay on top of mud. But it's more than just square inch of ground contact. Allis-Chalmers tractors have exactly the right combination of weight, center of gravity and clearance to stay afloat where other equipment bogs down.

They're agile climbers, too, with a combination of excellent balance and big power. From the 99-hp HD-11 to the 225-hp torque converter HD-21, Allis-Chalmers tractor engines have the deep-down lugability for steep hillside work.

Durability and safety are built in, too, with waterproof, internal-expanding side boom brakes . . . dropproof hydraulic counterweights . . . shock-absorbing,

move ahead with

OR MOUNTAIN

all-steel tractor main frame . . . durable, double-reduction final drives . . . toughest track ever made. Certified permanent lubrication of tapered roller bearing truck wheels, idlers and support rollers eliminates greasing — saves time and cost.

Your Allis-Chalmers dealer will give you moneysaving proof why the 127,000-lb capacity HD-21, the 78,000-lb capacity HD-16, and the 40,000-lb capacity HD-11 are your best tractor buys — come swamps, mountains or biggest inch pipe. Allis-Chalmers, Construction Machinery Division, Milwaukee 1, Wisconsin.

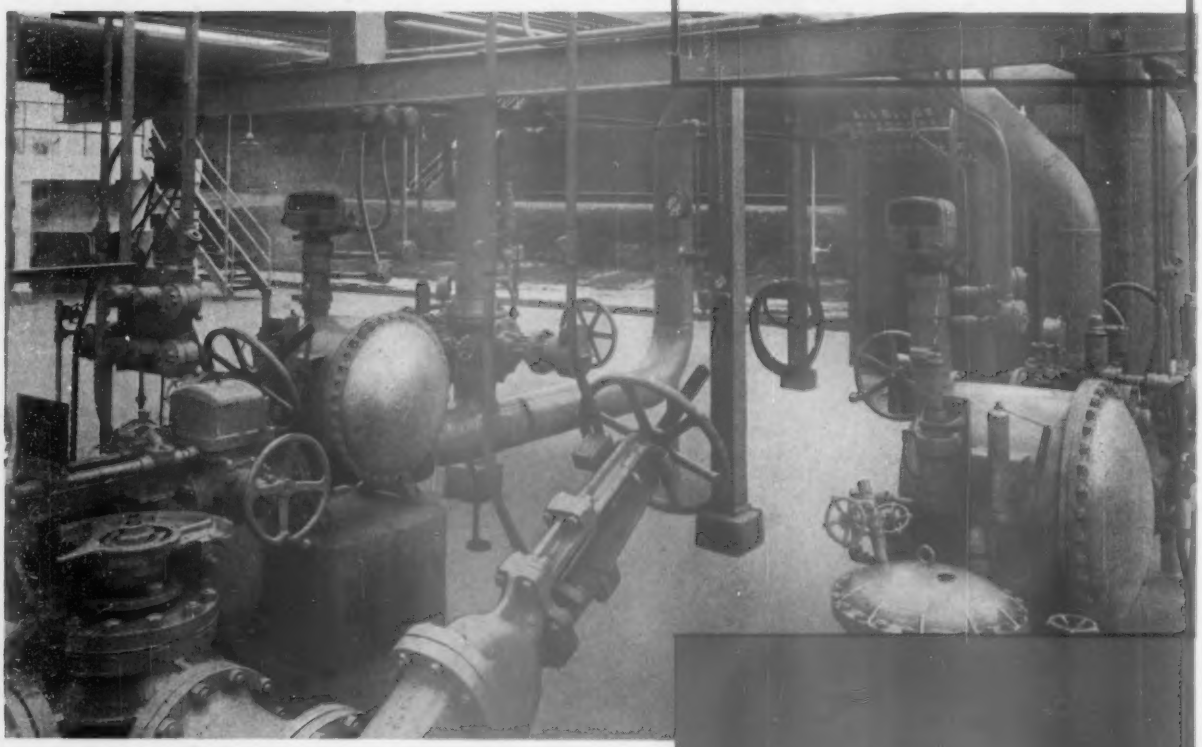
Now available in Persian Orange or Allis-Chalmers Yellow at no extra cost.

ALLIS-CHALMERS

power for a growing world

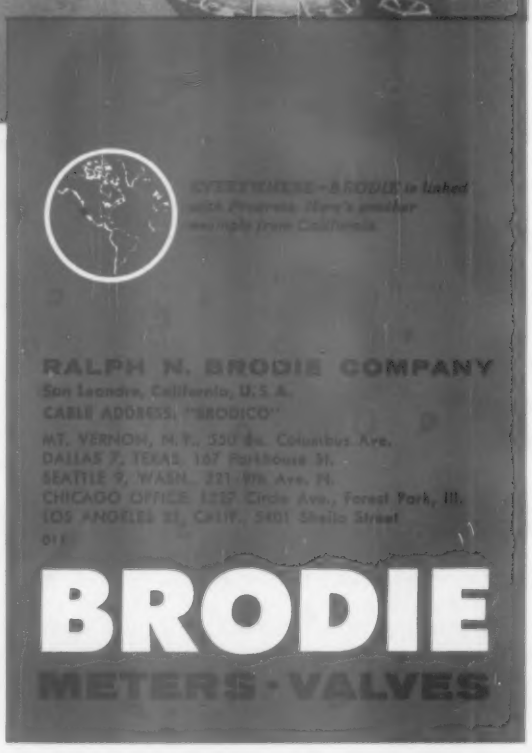
How BRODIE *BiRotors* Minimized Maintenance Costs

...two B-203 Meters on Union Oil Company crude line receiving facilities, Oleum Refinery, near San Francisco, California

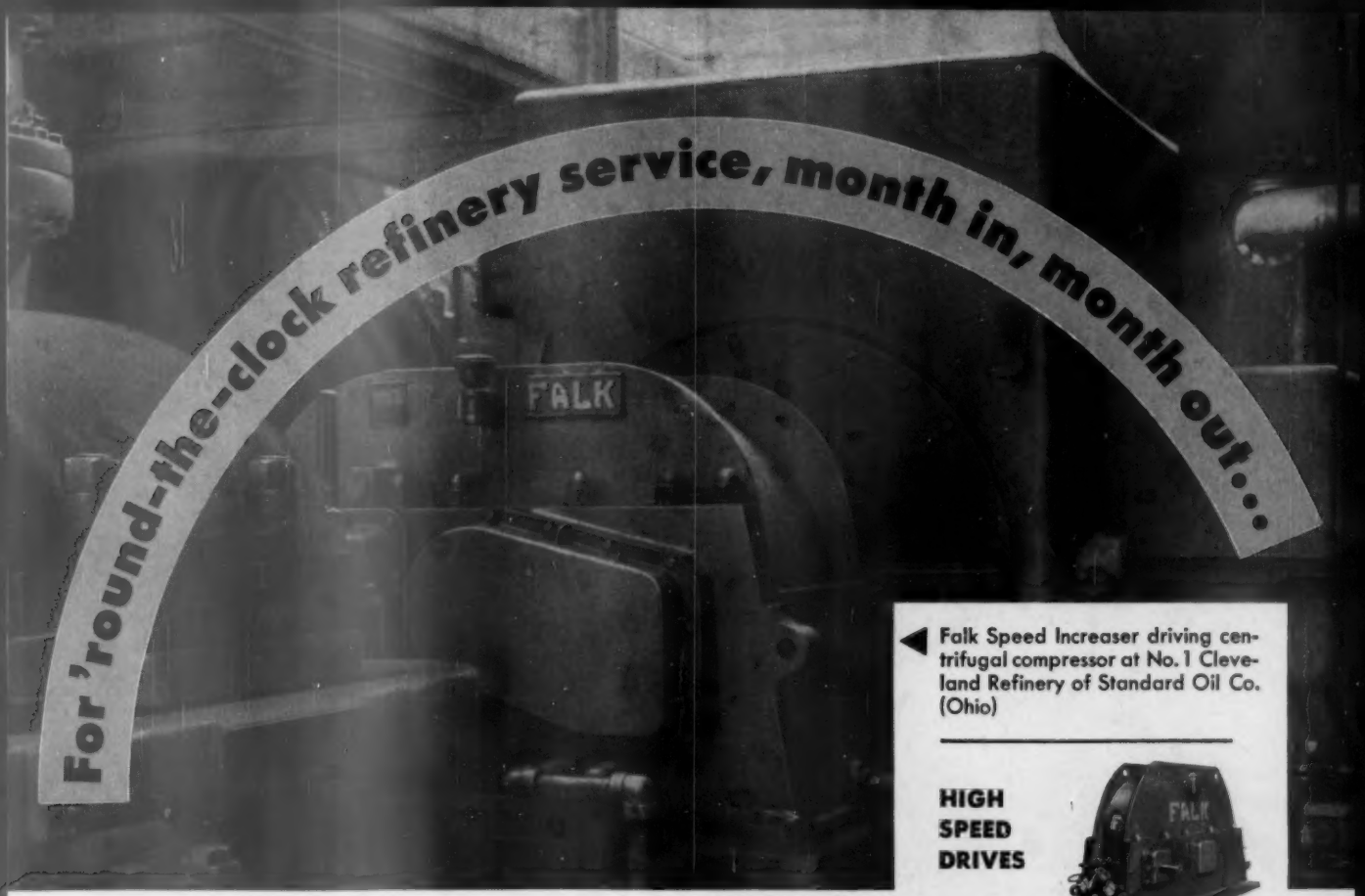


At this receiving terminal, two Brodie Model B-203 *BiRotor* Meters, connected in parallel, have handled 55,500,000 bbls. of crude, as of earlier this year. The total maintenance cost to date, including routine inspection, was only $352.00. Automated receiving, metering, and storage operations are monitored from a central control room, where *Brodimatic* remote ticket-printing counters permit automatic switching each time a new tender arrives. Thus, the constant attendance of an operator is not required.

This is another example of how Brodie *BiRotors* help keep costs down. You can save by standardizing on *BiRotor* Meters—*the standard by every comparison.*



REPRESENTATIVES WITH STOCKS AND SERVICE FACILITIES IN ALL PRINCIPAL CITIES



◀ Falk Speed Increaser driving centrifugal compressor at No. 1 Cleveland Refinery of Standard Oil Co. (Ohio)

FALK offers a complete line of standard high speed and semi-high speed drives

type P Ratios—from 2.5:1 to 12.0:1.
Horsepower—up to 2000 hp per 1000 rpm of high speed shaft.
Maximum speed of high speed shaft: 10,000 rpm.

type Q Ratios—from 1.15:1 to 9.5:1.
Horsepower—up to 1800 hp per 1000 rpm of high speed shaft.
Maximum speed of high speed shaft: 10,000 rpm.

type H Ratios—from 2.22:1 to 9.89:1.
Horsepower: up to 1100 hp.
Maximum speed of high speed shaft: up to 3600 rpm.

type S Ratios—from 1.49:1 to 25.4:1.
Horsepower—up to 224 hp.
Maximum speed of high speed shaft: 4500 rpm.

SPECIAL DRIVES...to any required speed and horsepower.

• • • • •

Designed and produced by the Falk engineers who pioneered the ultra-high speed gear units for aviation turbo engine test facilities, Falk standard high speed drives are widely used in refineries throughout the country. Our technicians will be glad to work with your engineers or with your equipment suppliers to select and produce drives precisely suited to your operation.

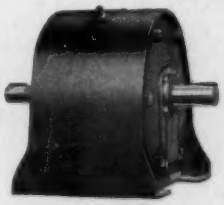
FALK is a Registered Trade Mark.

HIGH SPEED DRIVES

type P

type Q

SEMI HIGH SPEED DRIVES



type H

type S

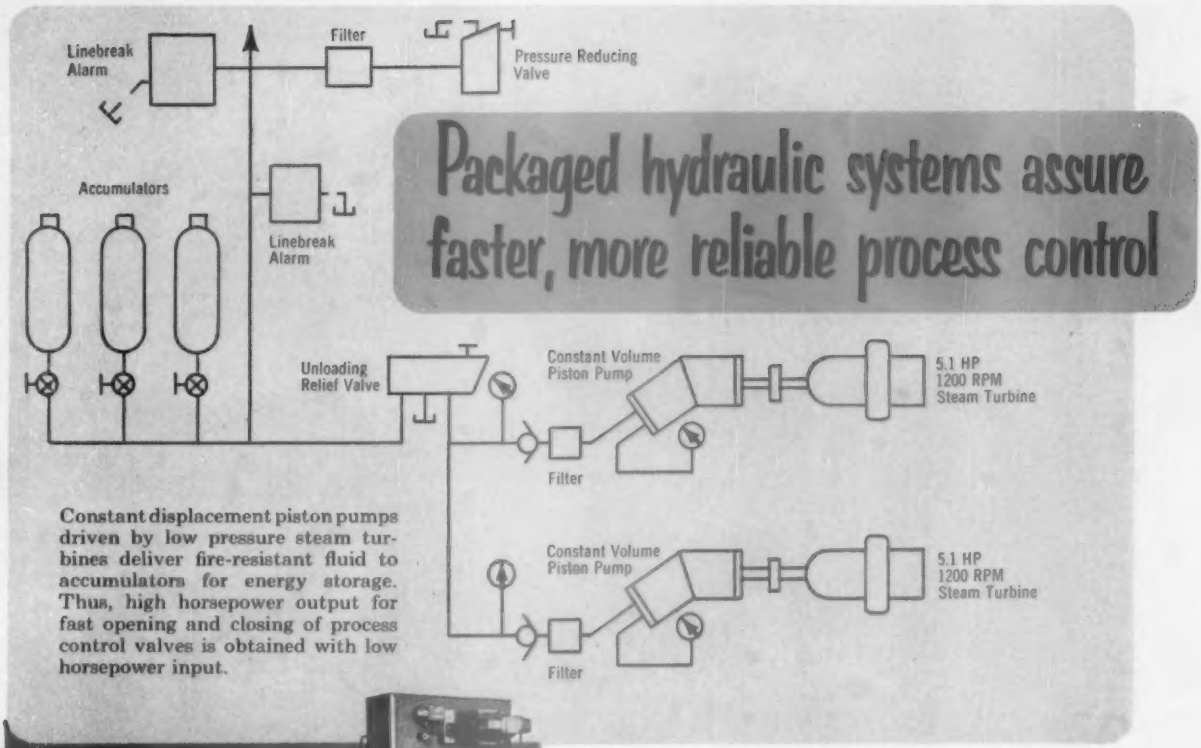
THE FALK CORPORATION, MILWAUKEE 1, WISCONSIN

MANUFACTURERS OF QUALITY GEAR DRIVES AND FLEXIBLE SHAFT COUPLINGS

Representatives in Most Principal Cities

FALK

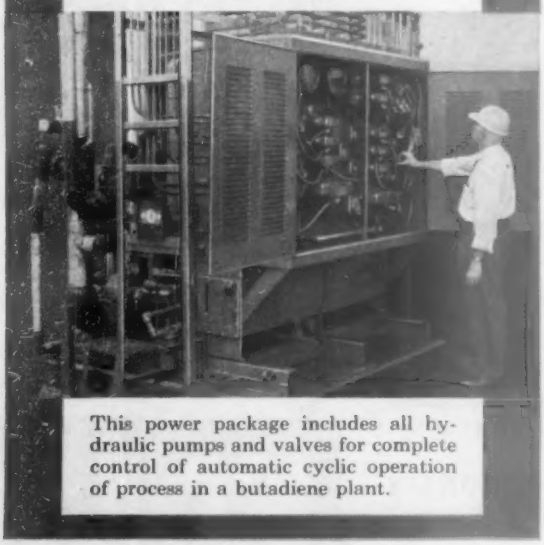
a good name in industry



Packaged hydraulic systems assure faster, more reliable process control

Constant displacement piston pumps driven by low pressure steam turbines deliver fire-resistant fluid to accumulators for energy storage. Thus, high horsepower output for fast opening and closing of process control valves is obtained with low horsepower input.

Control console and power unit form electro-hydraulic system for controlling automatic heat treatment cycle. Physical layout provides optimum circuit efficiency, ease of servicing, and good appearance.



This power package includes all hydraulic pumps and valves for complete control of automatic cyclic operation of process in a butadiene plant.

Fast and precisely controlled motions, having the high reliability demanded by modern processing, are inherent characteristics of hydraulics. In addition, these advantages are obtained at low cost, for you can cover your full range of operations—from valve control to power transmission—with standard Vickers components. Your engineers enjoy unlimited design flexibility through a choice of electric, electronic, pneumatic and manual signals to control the hydraulic pumps, motors, cylinders, and variable speed drives.

Vickers complete packaged systems are ready to go into service upon arrival in your plant, since they are thoroughly pretested before shipment. They are properly designed and built to give maximum service life with little downtime, thus helping to keep your plant on stream.

Get more information on the job being done by Vickers packaged hydraulic systems in chemical, petrochemical, petroleum refining, and other processing industries by writing today for Bulletin I5802, "Packaged Hydraulic Systems for Process Control."

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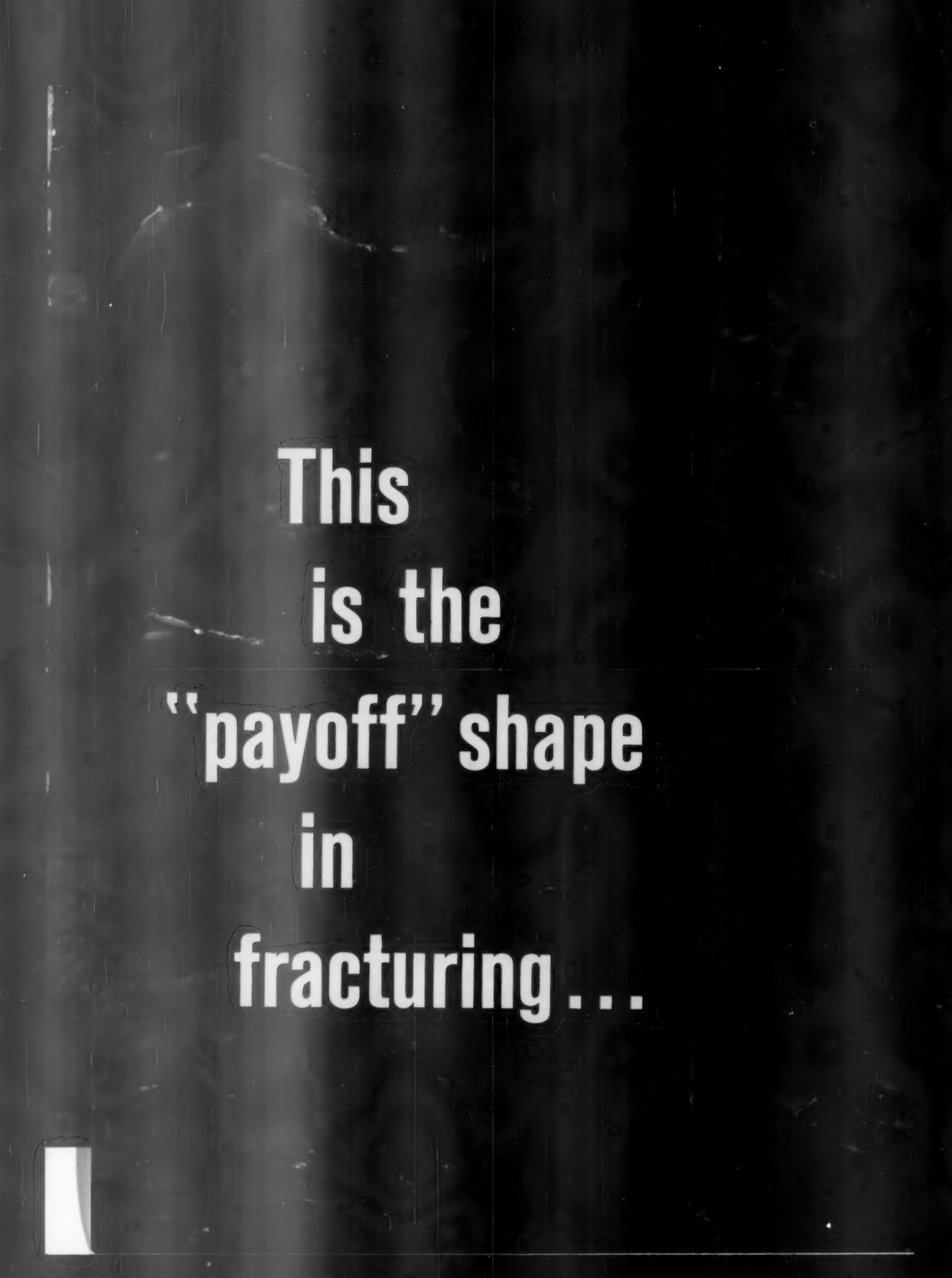
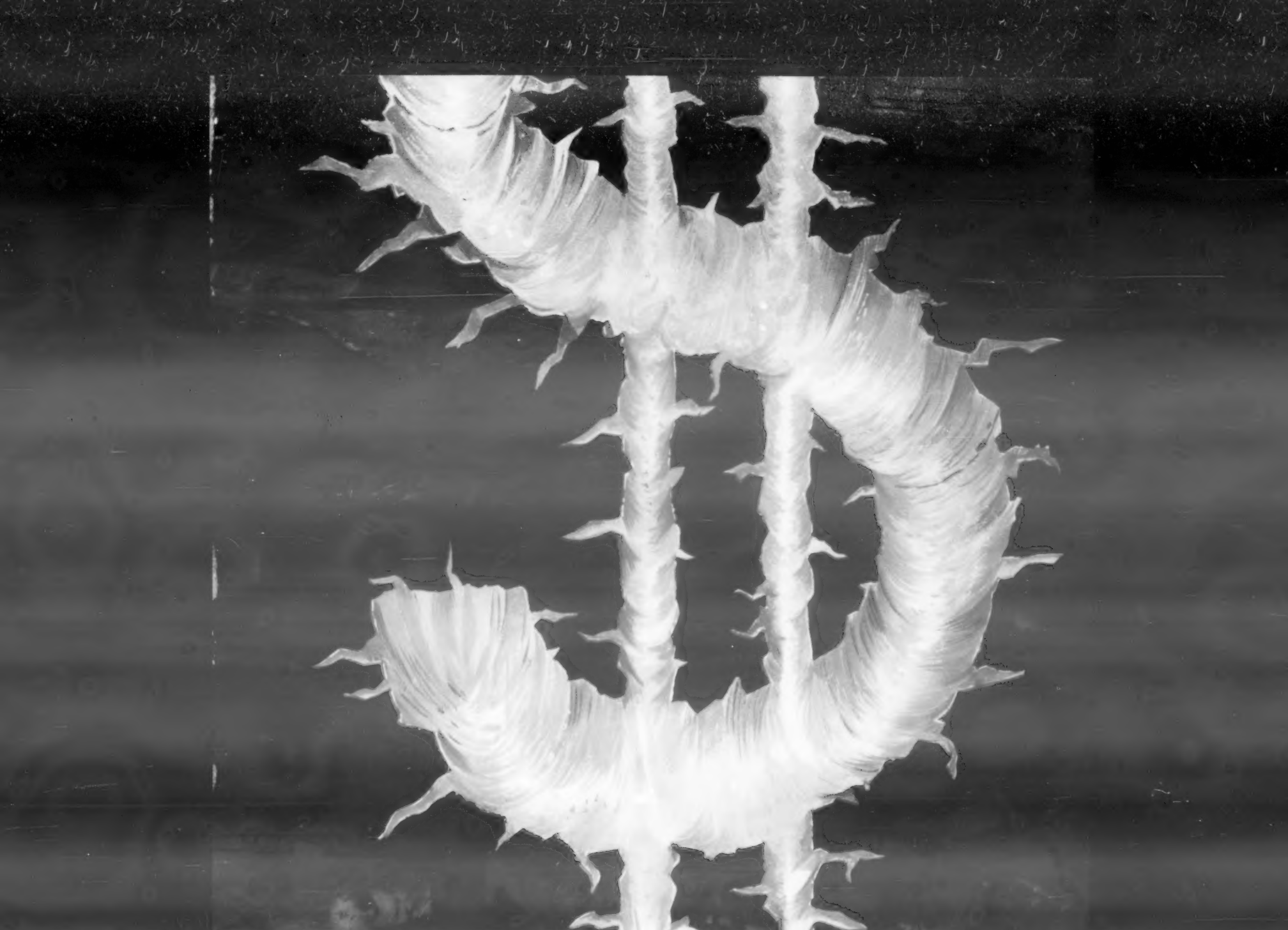

This
is the
"payoff" shape
in
fracturing...

this is the



this is the kind of fracturing we deliver!

Payout fracturing... fracturing that puts extra oil in your tanks... dollars in your pocket. This is the kind of fracturing you want. This is the kind of fracturing we deliver.

Our men know the field... the wells... the reservoir data. They know the fracturing fluids that will get the job done—and have the equipment and techniques to do it.

There is no substitute for this kind of knowledge and experience. That is why BJ Service delivers results for you. Results that pay off in lower fracturing costs... higher production rates... greater ultimate recovery.

BJ SERVICE, INC.

most effective fracturing force in the oil fields!

Ever since hydraulic fracturing was first introduced, BJ Service has been a leader in this well stimulation technique. Our contributions have included new carrying fluids with a low friction-loss, new blocking agents and new tools and equipment that have sharply increased the success ratio of well treatments.

Other pioneering achievements by BJ Service include patented Select-O-Ball sealers for selective fracturing of perforated zones in cased holes... Formjel, a superior temporary blocking agent that works within the formation rather than at the well bore alone... and the first phone-intercom system for rapid communication among crewmen during a frac job.

These advanced materials, methods and equipment are employed by the finest manpower in the oil patch – men thoroughly trained in both theory *and* practice. It's this combination that has given BJ Service its reputation as the "most effective fracturing force in the oil fields."
For proof, call us on your next fracturing job.

OIL WELL SERVICES

BJ Service

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BJ B-W SERVICE

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Long Beach, California • Arlington, Texas • Stations in all major oil fields

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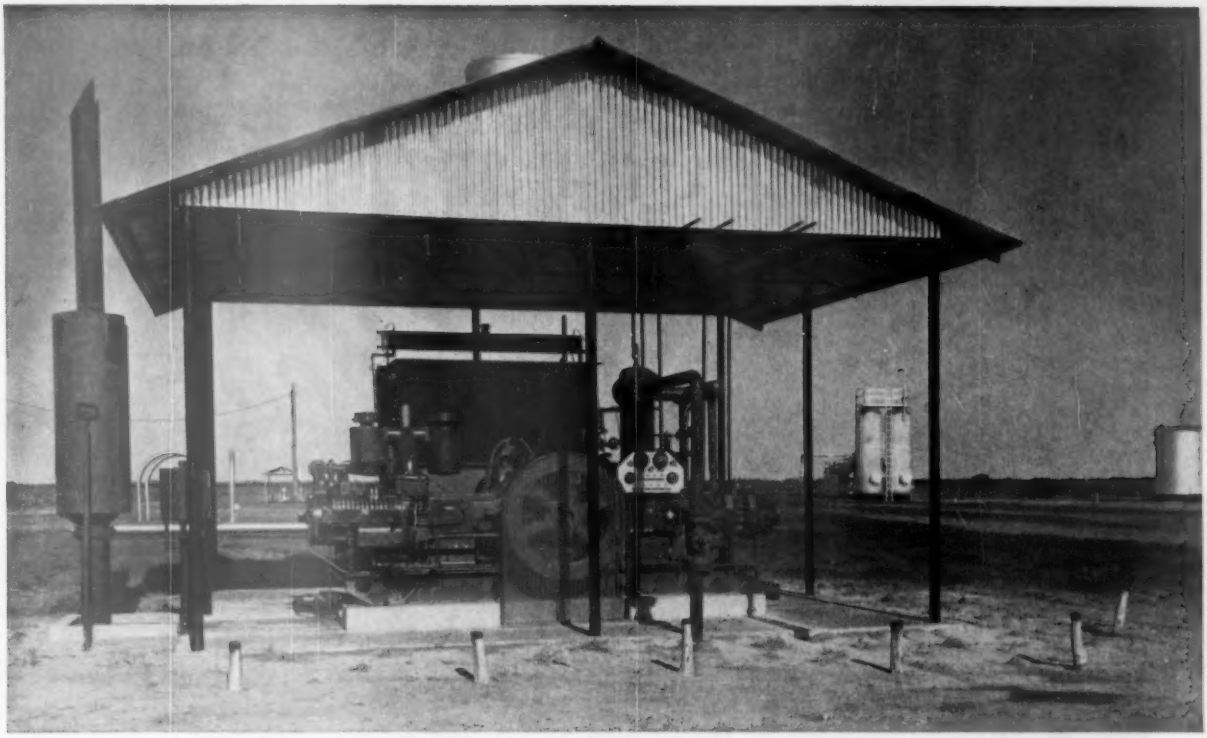
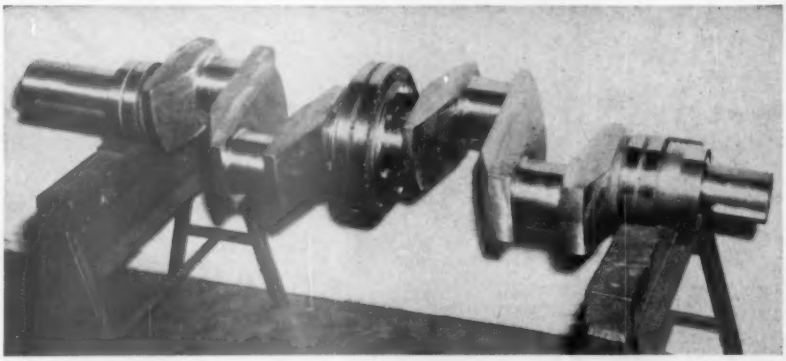


HIDDEN WORKERS KEEP COMPRESSOR GOING, GAS FLOWING

To keep this DPC 230 compressor working day and night—unattended—was one of the objectives of Ajax Iron Works engineers when they designed it. They had to have crankshaft bearings that would be long wearing, run "clean", and not trap any damaging foreign material. So they specified Timken® double row tapered roller bearings—"hidden workers" on the crankshaft ends and center position.

The hardened surfaces of Timken bearings virtually eliminate wear. And the natural pumping action of the bearing moves the oil fed to the center of each cup through the bearing. Foreign particles are flushed out. Assembly was simplified too, because the two separate cones of the center bearing permit slipping it over the crankshaft throws.



HELPING AJAX select the right Timken bearings for the compressor crankshaft (above) is typical of the service of Timken graduate sales engineers. Their engineering service can often solve bearing problems on the spot, save you time and money.

Industry rolls on

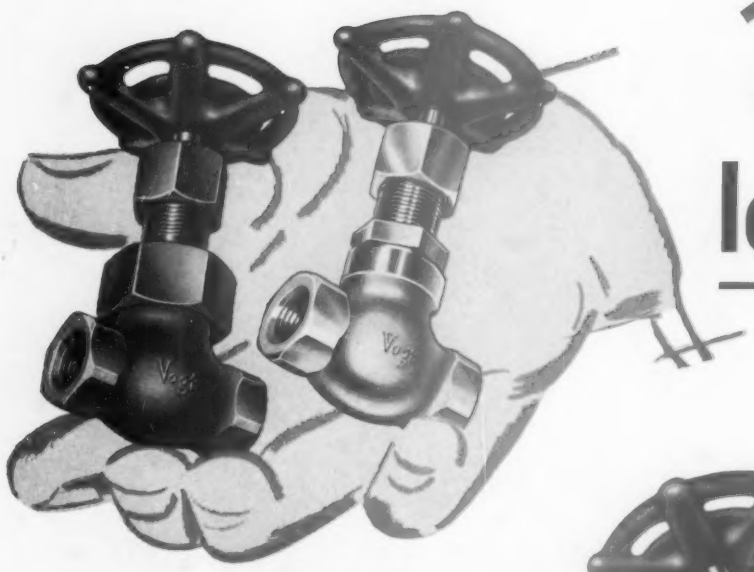
TIMKEN®

tapered roller bearings

The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO." *Makers of Tapered Roller Bearings, Fine Alloy Steel and Removable Rock Bits.* Canadian Division: Canadian Timken, St. Thomas, Ont.

New higher quality

New lower price



Enlarged production facilities combined with improved manufacturing techniques enable Vogt to pass on the effected savings to our customers.

Service proved — these valves have always been a standard of quality for meter and gauge line service. You no longer need to compromise for less because of price! Send for Folder GP-9 giving specifications and engineering data on both globe and angle types, forged from stainless or carbon steel for every meter and gauge line service.

Address Dept. 24A-FO

METER & GAUGE LINE

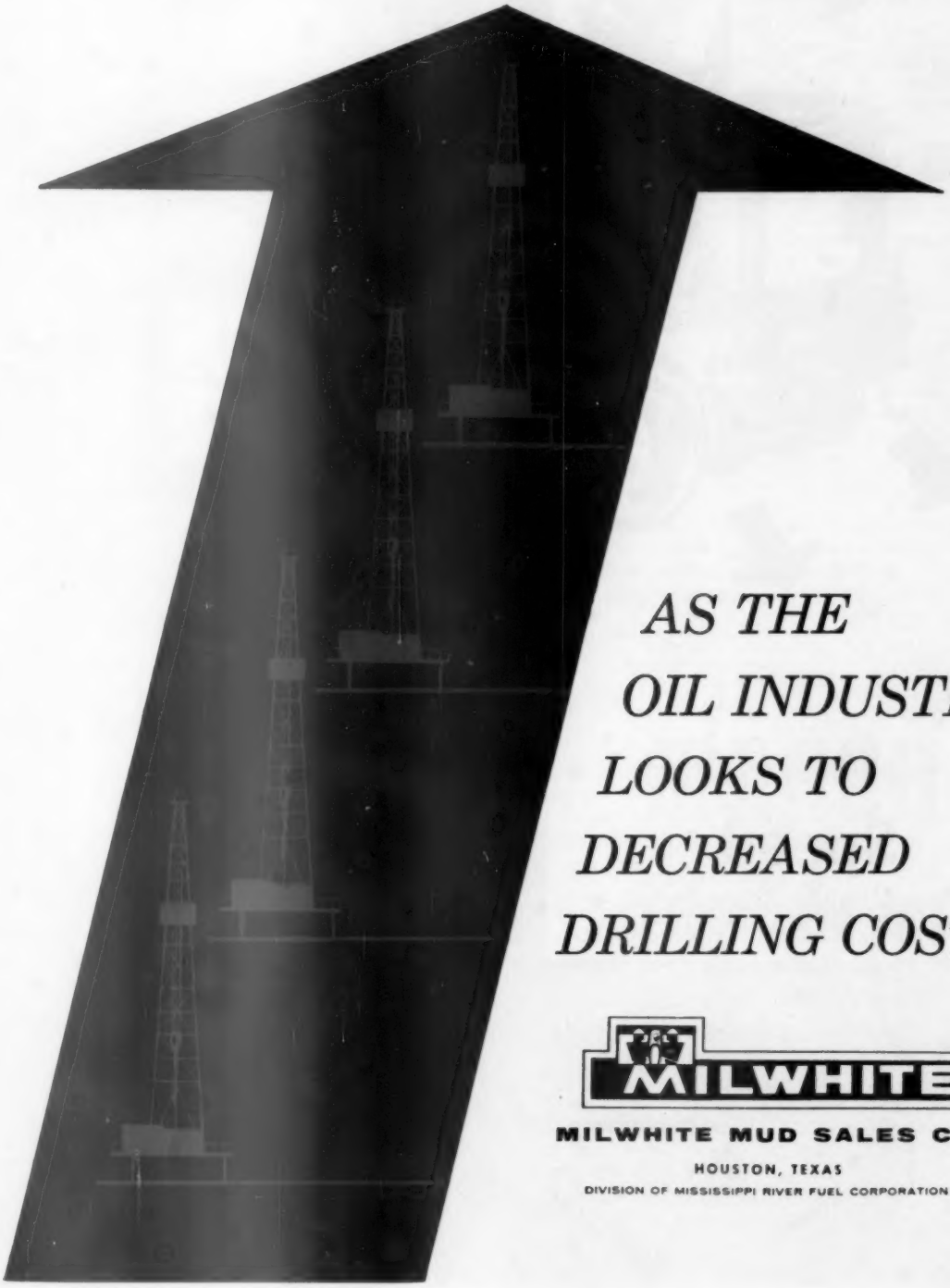
Vogt

VALVES

HENRY VOGT MACHINE CO.
Louisville, Kentucky
SALES OFFICES: Camden, N. J., Charleston, W.Va., Chicago, Cleveland, Dallas, Los Angeles, New York, St. Louis.

MILWHITE MUD SALES AT

ALL TIME HIGH



AS THE OIL INDUSTRY LOOKS TO DECREASED DRILLING COSTS

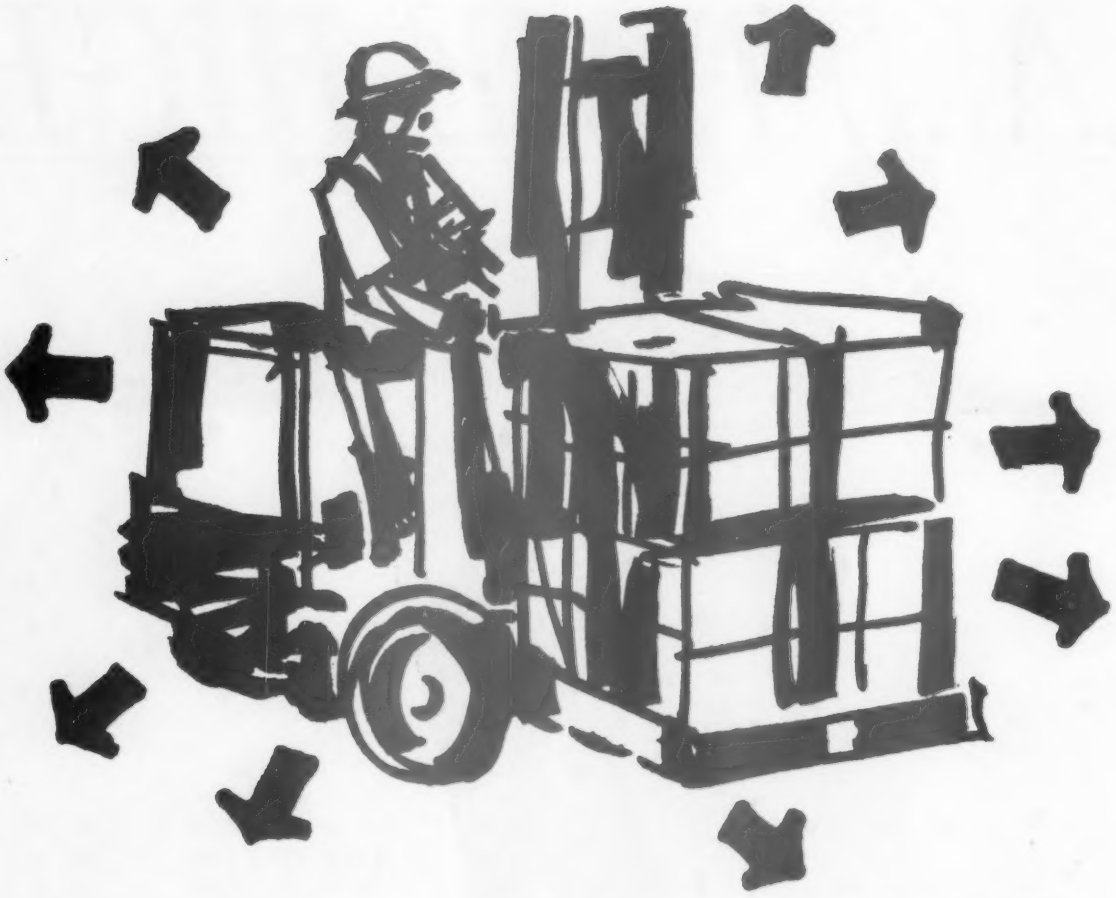
MILWHITE

MILWHITE MUD SALES CO.

HOUSTON, TEXAS

DIVISION OF MISSISSIPPI RIVER FUEL CORPORATION

SHEFFIELD Best in Bolts Since '88



Strong
Tough
Economical
Efficient
Lasting

Steel

Big Bolt Plant

Speed Bring your metal fastener needs to bolt headquarters — to Sheffield. Vast facilities, production skill, and quick availability add up to big-plant capacity — quick shipment. ■ Big plus at Sheffield right now is new hi-strength (cold-forming) machinery. Hi-strength bolts and cap screws are available in a wider range of sizes and types, including 1″ in diameter. Sheffield offers more than 50,000 different standard and special bolt products. ■ Chances are we have just the fastener you need. If not, ask us about designing and building it for you — FAST. Ask the Sheffield bolt man. **Sheffield Division, Armco Steel Corporation —Kansas City, Houston, Tulsa.**

ARMCO Sheffield Division

Know it by the yellow handle

Use it because it embodies features never before combined in a needle throttling valve . . .

It is the first throttling and shut off valve that serves the whole range of pressures—from low to 10,000 psi—with equal efficiency all the way through.

It is the valve in which body and stem guide are one piece—completely fused into an integral leak-proof unit by the exclusive Marsh "Conoweld" process.

It is the valve in which the stem is precision machined and ground. Perfect stem alignment and fine threads provide easy and precise throttling. Special "Marpak" packing always holds tight; never binds.

Bodies of the 1900 series identified by the yellow handle are machined from high grade carbon steel bar stock marked in accordance with M.S.S. regulations showing size, material and service. Stems are 416 stainless steel. Valves are available in the patterns shown below; sizes ⅛", ¼", ⅜", ½", ¾" and 1".

Marsh Needle Valves are also available in 416 stainless steel throughout (identified by green handles). *Write for bulletins.*

MARSH INSTRUMENT COMPANY, Dept. L, Skokie, Ill.
Division of Colorado Oil and Gas Corporation
Marsh Instrument & Valve Co. (Canada) Ltd., 9407 103rd St., Edmonton, Alberta
Houston Branch Plant, 1121 Rothwell St., Sect. 15, Houston, Texas

In stock at your nearest Supply House

Conventional Construction — **Marsh Construction**

In conventional valve (left) stem-guide is threaded into body . . . can be backed out when valve is fully opened, causing real trouble when pressure is high. Can't happen with Marsh design (right). Marsh stem-guide is welded to body.

MARSH

SERIES 1900

Needle Valves

RELY ON
McKissick
TUBING BLOCKS
Standard of the Servicing Industry

FAST. . .

SAFE . . .

DEPENDABLE . . .

Broadest range of sizes, types and capacities . . . designed for all servicing use.

Be Specific . . . Get McKissick

McKissick

McKISSICK PRODUCTS COMPANY
Drawer 768 • Tulsa, Okla.

QUICK RETRIEVING OF A FISH CAN BE ACCOMPLISHED

MAJOR FISHING JOBS CAN BE PREVENTED

WHEN YOU KEEP A

BOWEN RELEASING AND CIRCULATING OVERSHOT

AVAILABLE

A high percentage of fishing jobs are the result of twist-offs. Immediate recovery action can PREVENT a troublesome, time-consuming, expensive fishing job.

The longer a fish remains in the hole, the greater the fishing problem becomes and the more difficult and costly it is to retrieve. Restore Circulation — Recover The Fish Fast — Prevent High Expense with a BOWEN RELEASING AND CIRCULATING OVERSHOT!

Bowen Overshots are compact, durable and powerful, and are capable of withstanding extreme pulling and jarring strains without damage to the tool or fish.

Bowen Overshots can be dressed to recover many different sizes of fish, to mill over, catch and pack off. They are available in a complete range of sizes for tubing and drill strings.

Send for complete technical literature!

For over 25 years—the world's leading manufacturer of fishing and specialty tools.

BOWEN ITCO, INC.
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Houston 13, Texas, U.S.A.
Cable Address: ITCO

BOWEN

He sells speed to oil men

Here, at the control panel of a Gardner-Denver "2100" drawworks, a Gardner-Denver Petroleum Specialist is introducing a new concept in efficiency: operation so smooth, and with such ample reserves of hoisting and braking power, that it amazes even veteran drillers.

But the Gardner-Denver Specialist is selling more than just a product.

He is selling *speed—drilling speed* that can save days and even weeks of time. The "2100" drawworks is part of a completely co-ordinated Gardner-Denver ultra-modern rig, capable of drilling today's deepest wells at record-making paces.

Gardner-Denver Petroleum Specialists have a single objective: to serve you better, thus assuring your *continuing* satisfaction. That is why so many oil field buyers prefer to deal with Gardner-Denver.

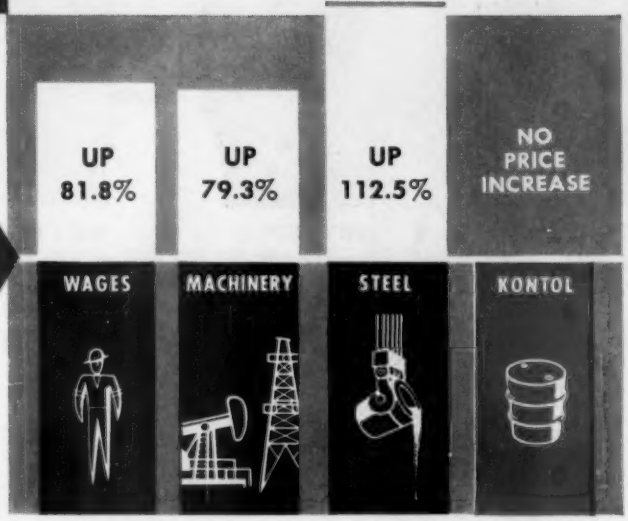
EQUIPMENT TODAY FOR THE CHALLENGE OF TOMORROW

GARDNER - DENVER

Gardner-Denver Company, Quincy, Illinois
In Canada: Gardner-Denver Company (Canada), Ltd., 14 Curity Avenue, Toronto 16, Ontario

another

TRETOLITE SERVICE report

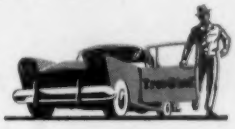


IN A PERIOD OF RISING PRODUCTION COSTS

KONTOL *prices are still at 1948 level!*

The Tretolite research staff constantly seeks ways to produce better KONTOL* Corrosion Inhibitor formulas for less money. This concern for *cost control* as well as *corrosion control* has kept the per gallon price of KONTOL at the 1948 level! Today, when costs of equipment, material, and wages are spiraling higher, it makes more sense than ever before to invest in a sound KONTOL corrosion control program.

Ask the Man in the Red Car how it can be done.



*Registered trademark, Petrolite Corporation

PETROLITE CORPORATION

TRETOLITE COMPANY DIVISIONS

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GERMANY, Frankfurt, a. M. • VENEZUELA, Caracas

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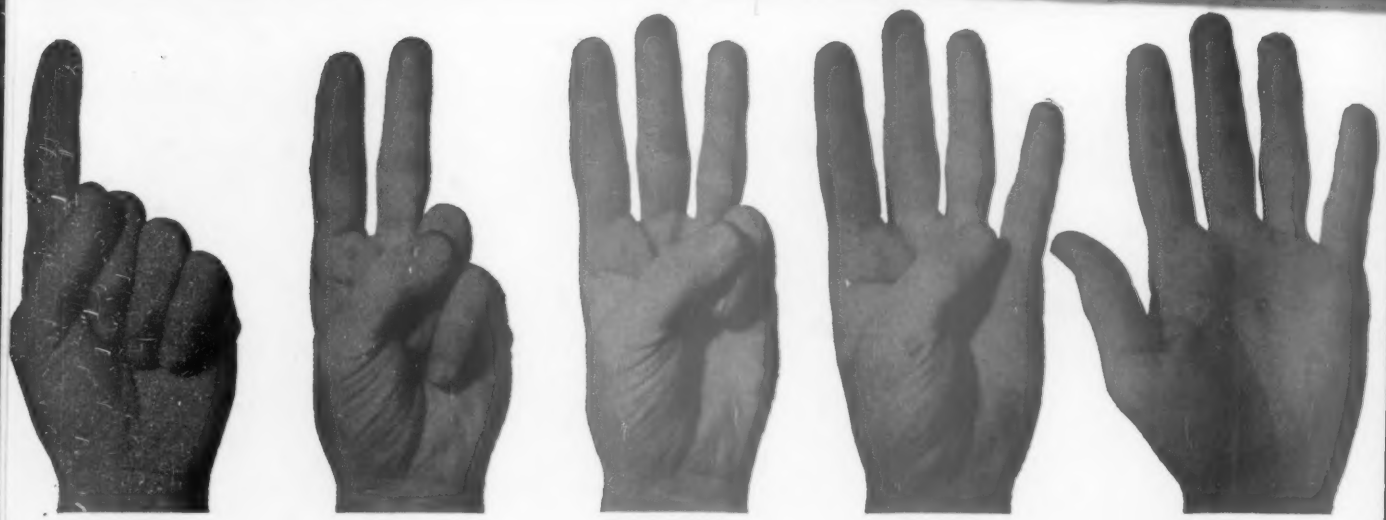
FA-60-3A



BETTER drilling rates in all types of muds: T-8, lime, gyp, and low pH, with varying amounts of oil.

BETTER (lower) barite requirements when substituted for oil in muds.

BETTER hole lubrication, in all types of muds, to reduce pipe sticking.

BETTER bit bearing life **even in high solids muds.**

BETTER geological interpretation and electrical logs; no fluorescence.

PLAN WITH BIT LUBE to drill 5 ways better . . .

MAGCOBAR PLANNED MUD PROGRAMS make the above statements facts, not claims. In high weight emulsion muds, for example, the Magcobar engineer properly substitutes Bit Lube® for some of the oil to cut drilling costs by reducing the amount of barite required. In a typical well, the oil content of the mud was allowed to drop from 11 to 5 per cent. Bit Lube was added to this 17.8 lb./gal. lime mud with these savings in barite:

	Sacks of barite per day	Cost of barite per day	Cost of Bit Lube per day	Cost of Oil per day	Total Cost per day
Emulsion (2 week average)	177	$409.76	$—0—	$74.03	$483.79
Bit Lube and Emulsion (3 week average)	52	120.38	122.43	8.25	251.06

NET DAILY SAVINGS WITH BIT LUBE: $232.73

Not only does Bit Lube give direct cost savings, but it also offers escape from costly pipe sticking, even in extreme directional holes. Bit Lube lowers the friction coefficient of the mud, to give over-all higher drilling mud performance. These savings can be added to those in the chart.

The skilled use of good products like Bit Lube to cut drilling costs is the heart of Magcobar Technology. Let the Magcobar engineer plan the mud program for your next well and this Technology will save for you all along the line.

Magcobar
Complete
DRILLING MUD SERVICE

DRESSER INDUSTRIES, INC.
OIL • GAS • CHEMICAL
ELECTRONIC • INDUSTRIAL

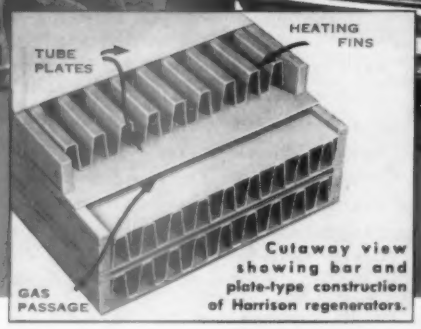
OPERATION "FEEDBACK"!

Now . . . GM Harrison Reliability in Heat Recovery on Nation's Pipelines

Saves weight . . . saves space . . . saves installation costs! Yet this Harrison regenerator, warm friend of the gas turbine, provides full efficiency plus GM Harrison reliability.

With typical thoroughness, Harrison engineers analyzed more than 500 design configurations in their relentless search for the most effective and most compact regenerator. The unit they designed requires smaller foundations and chops a full week or more from erection time.

And, it has already proved its reliability in the field. We call this reliability "measurable excellence," and it's built in to all Harrison products to make them perform precisely as planned. This kind of reliability is a direct result of Harrison's 50 years of experience in the heat transfer field and Harrison's constant aim to make the finest possible heat exchangers.



Cutaway view showing bar and plate-type construction of Harrison regenerators.

Free For an informative 48-page brochure on the complete Harrison line . . . write to Department 902

GM HARRISON

TEMPERATURES MADE TO ORDER

AIRCRAFT, AUTOMOTIVE, MARINE AND INDUSTRIAL HEAT EXCHANGERS

HARRISON RADIATOR DIVISION, GENERAL MOTORS CORPORATION, LOCKPORT, NEW YORK

INDUSTRY-WIDE USE

BUILT ON OUTSTANDING PERFORMANCE

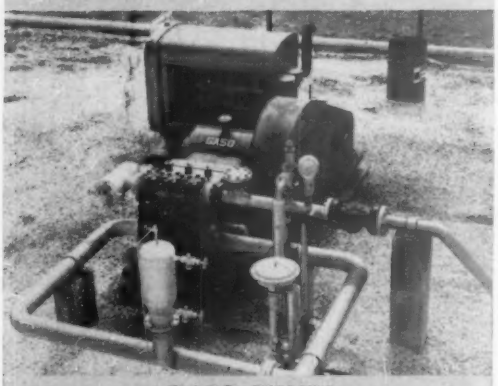
Not too long ago Gaso Pumps were known principally for their work in pipe line service.

Today they are specified in ever increasing volume by all branches of the industry.

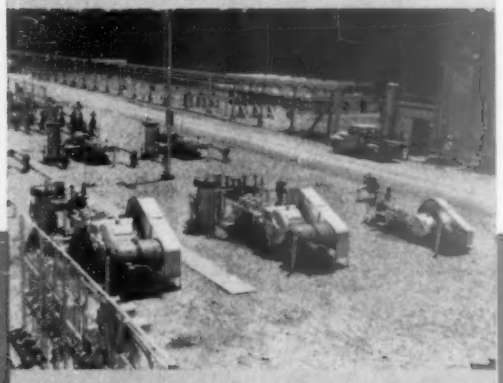
The reason is obvious: Engineers concerned with water flooding, salt water disposal, oil well cementing, oil well acidizing and fracturing, LPG underground storage, mine water disposal and other operations involving pumps are just as interested as pipe line engineers in the extra years of trouble-free service which have become a Gaso trademark.

Performance speaks a universal language, and it's performance upon which Gaso leadership is built.

GASO PUMPS IN PIPELINE SERVICE



GASO PUMPS
FOR SALT WATER DISPOSAL



GASO PUMPS IN LPG SERVICE

GASO PUMPS
for every oil industry need

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1960 - 1961
CATALOG

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PUMPS FOR:

CRUDE OIL GATHERING LINES • CRUDE OIL PIPE LINES • PETROLEUM PRODUCTS PIPE LINES • GASOLINE PLANTS-ABSORPTION OIL • LPG UNDERGROUND STORAGE • WATER FLOODING • OIL WELL CEMENTING • OIL WELL ACIDIZING AND FRACTURING • SMALL VACUUM SYSTEMS

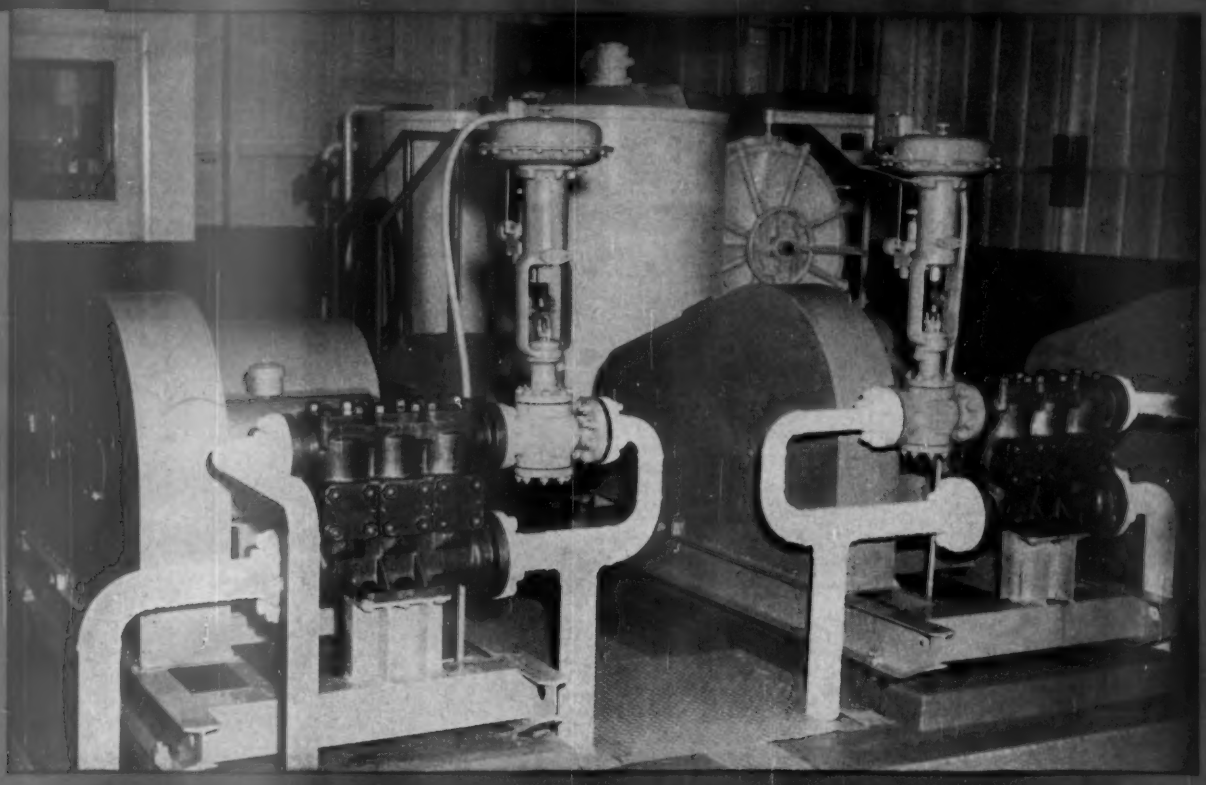
GASO PUMP & BURNER MFG. CO. First and Lansing Streets, Tulsa Oklahoma • Export Office: Empire State Building, New York, N. Y.

WORLD WIDE PREFERENCE

GASO PUMPS

WHAT'S BACK OF GASO LEADERSHIP IN

WATER FLOODING?



There's a Single-Word Answer: PERFORMANCE

The photograph shows one of a steadily mounting number of Gaso installations in water flooding service.

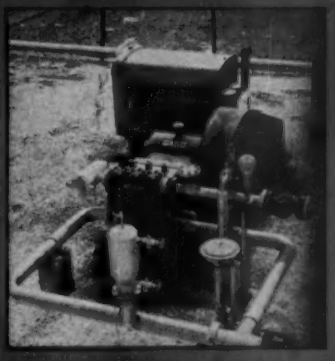
The injection pumps (3) are Fig. 3365, 1¾" x 3" Gaso Horizontal Triplex Plunger Pumps, driven by 40 HP 1200 RPM electric motors.

The fluid ends are of aluminum bronze fitted with ceramic plungers, non-adjustable type plunger packing (in both power and fluid ends) and Bakelite insert type valves mounted on Monel valve seats.

Each of the three pumps, operating at 350 RPM, delivers approximately 1075 barrels a day at 1500 pounds discharge pressure.

Complete adaptability to the job plus GASO design throughout is a time-tested guarantee of thoroughly dependable service extending far beyond the normal life expectancy of pumping equipment.

In the GASO line you will find the effective answer to any pumping problem associated with water flooding. Write for our 1960-61 catalog, or get in touch with our nearest distributor.



Gaso Pump in salt water disposal service in Louisiana

GASO PUMPS

for every oil industry need

GASO PUMP & BURNER MFG. CO.
FIRST and LANSING STS., TULSA, OKLAHOMA
EXPORT OFFICE: 2712 EMPIRE STATE BLDG.
NEW YORK, N. Y.

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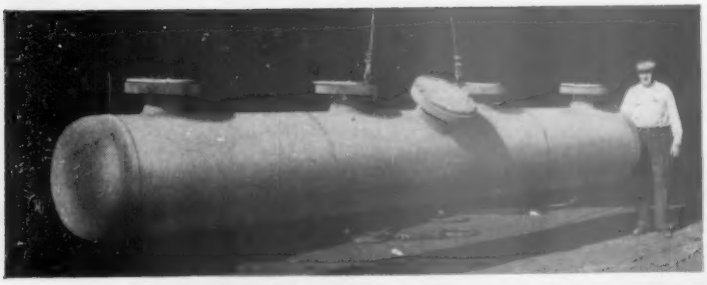
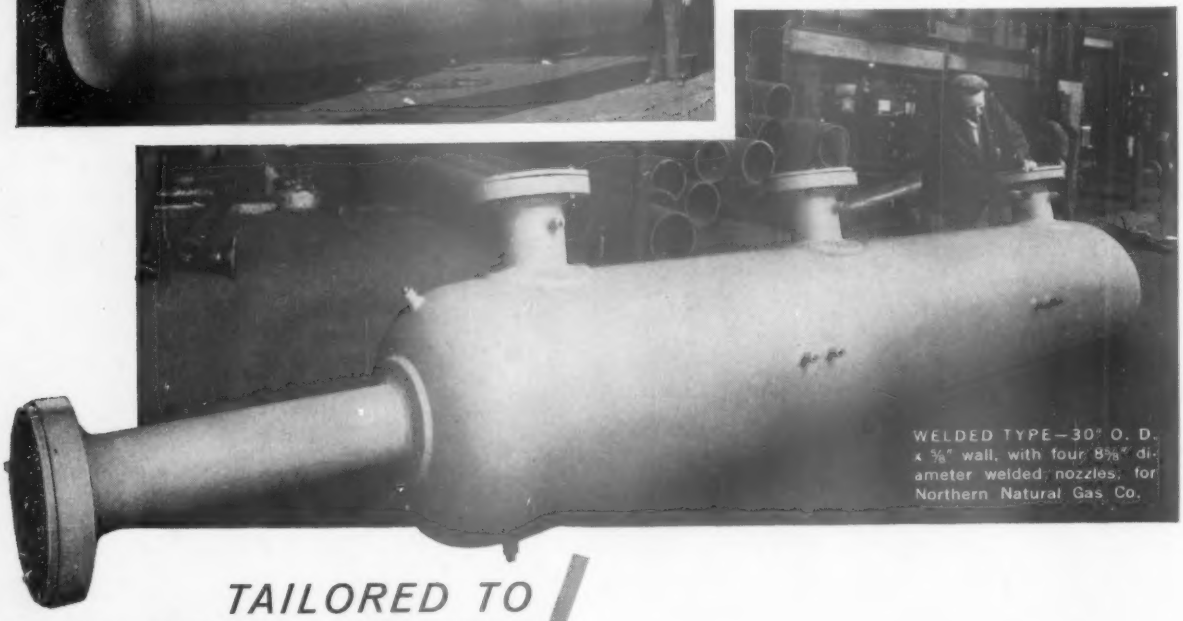


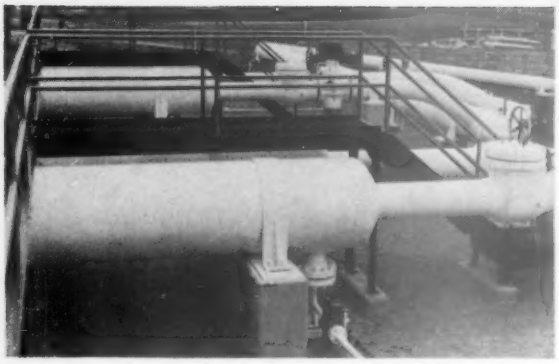
EXTRUDED TYPE—30" O. D. x 1¼" wall, with four 8" and one 12" diameter extruded nozzles; for Peoples Gulf Coast Natural Gas Pipeline Co.



WELDED TYPE—30" O. D. x ⅝" wall, with four 8⅝" diameter welded nozzles; for Northern Natural Gas Co.

TAILORED TO YOUR REQUIREMENTS

MIDWEST PULSATION DAMPENERS



Midwest—fabricated 34" pulsation dampener installed at Texas Gas Corporation's compressor station at Slaughters, Kentucky.

In any size or wall thickness, for operation at pressures up to 900 pounds or more, in Tri-Ten, A-212-B steel or any other weldable metal / Welded nozzle or extruded nozzle construction / Fabricated to code requirements / Excellent quality—long life / Dependable delivery—four fabrication plants across the nation. Send us details for quotation on your pulsation dampener requirements.

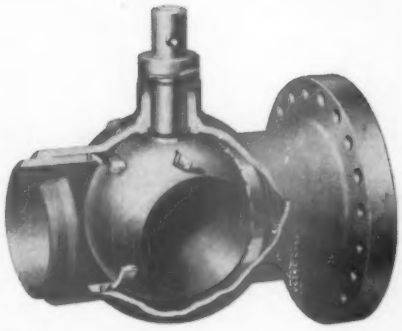
TODAY! Write for NEW bulletin 60-C describing Midwest Seamless and Welded-type fittings.

MIDWEST

6015

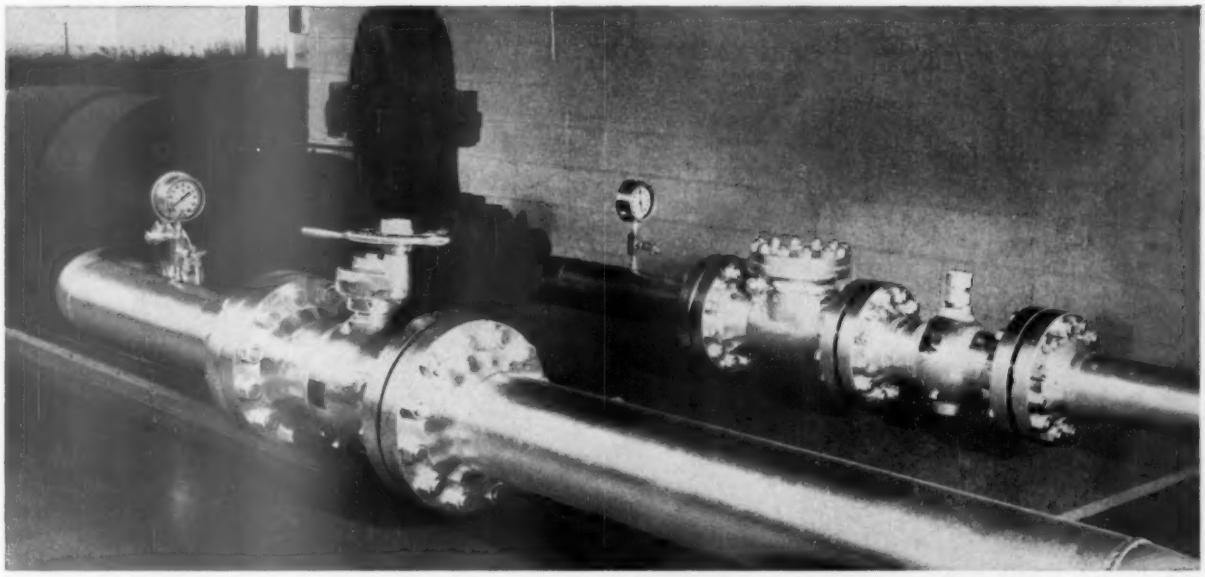
MIDWEST PIPING CO., INC.
1450 South Second Street • St. Louis 4, Mo.

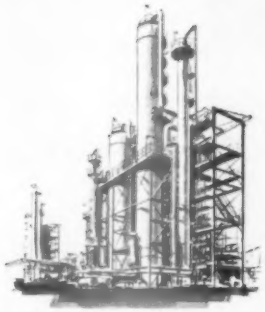
SAY GOODBYE TO VALVE REPAIR



That's right – with Cameron Ball Valves on the job you never need to make repairs. This big step forward in valve design – which makes practical the "sealed for life" construction – is brought about by the exclusive rotating seat principle which has proven so successful in our Type "F" Gate Valves.

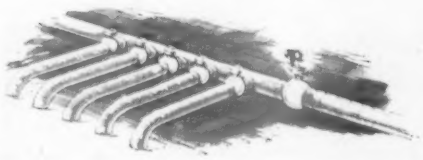
Sturdy dogs on the Ball engage gear-like teeth on the Seat Rings to rotate the Seats a fraction of a turn each time the valve is opened. In all valves, maximum wear occurs on the seating surface area which is struck by the erosive blast of line fluid just as the port is uncovered on opening, or just as the flow is being pinched off on closing.





Rotation of the seats distributes this wear equally over the entire sealing surface and extends the life of the valve many times over valves with stationary sealing surfaces.

Also, being non-lubricated, all maintenance costs are eliminated. This means substantial savings in man hours, down time and inventories. Low torque requirements allow smaller operators – less energy on remote controls – easier operation an manual controls. Maximum economy – Maximum service – Mimimum size and weight. Available in sizes 2" to 36" in ASA and API ratings and with any type of end preparation. If you plan, specify or purchase valves, call or write Cameron for complete details.



Cameron

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Memo to Management:

ONE BILL...ONE RESPONSIBILITY
MEANS A BIG SAVINGS TO US...

Whether it's power for a pipeline, refinery or pumping, many oil companies prefer to purchase dependable utility electric power and get all power bills on one convenient monthly invoice. Utility electric power works 24 hours a day or operates on any fractional time schedule . . . in any case you pay only for the power used and eliminate many worries. For details contact your nearest Utility Electric Power Company.

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from **APPLETON**®

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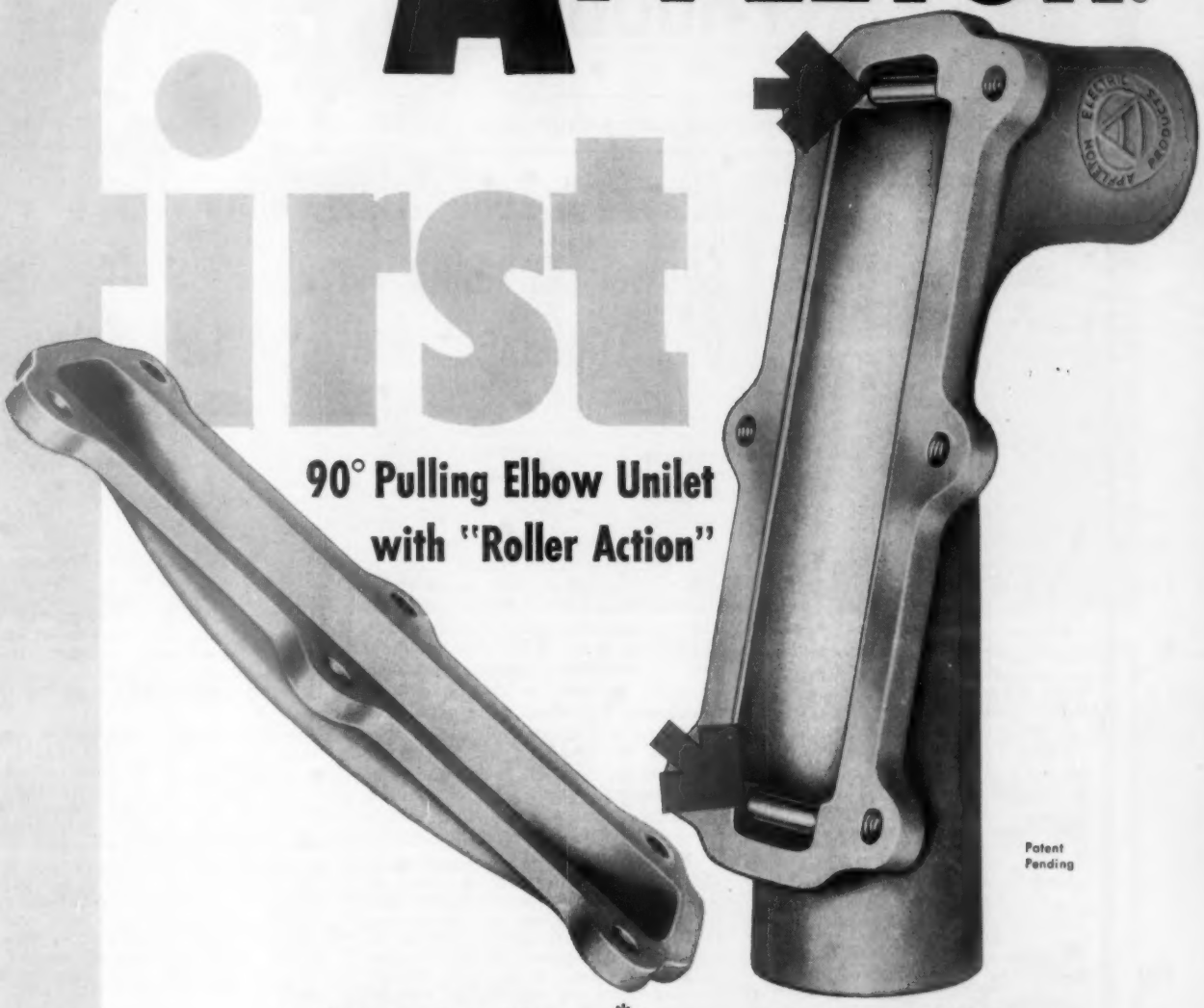
90° Pulling Elbow Unilet with "Roller Action"



Patent Pending

Explosion-Proof*, New..90° "Roller" Elbow

It's a time and cost saver for your more difficult wiring installations in hazardous locations. Large cables literally "roll through" the Appleton ELBD Unilet to give you faster, easier, lead-in wiring for motors, panel boards, circuit breakers and similar equipment.

Two, exclusive, built-in rollers guide and protect bulky cable through the chamfered hubs to complete those bulky right-angle turns WITHOUT damage to insulation or knuckles. And an all-position dome cover bolts to the precision-machined Unilet body easily, quickly to insure a totally safe, permanent, explosion-proof seal every time.

Order from your distributor now . . . Unilets available in 2½" to 4" sizes WITH ROLLERS; 1" to 2" sizes LESS ROLLERS.

Sold through franchised distributors only

APPLETON® *electric company*

Also manufacturers of:

*Class 1, Group D; Class 2, Groups E, F, G

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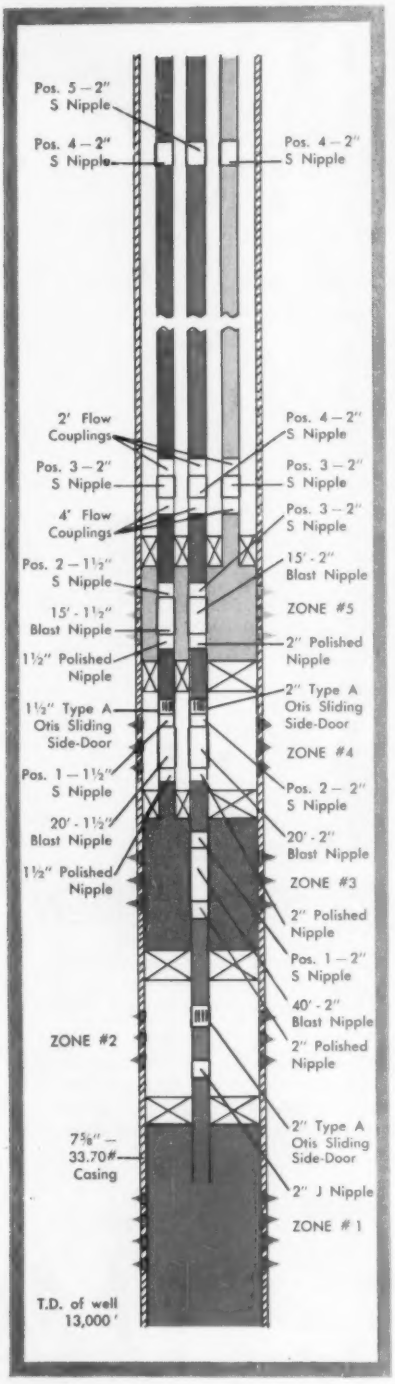
OTIS PRODUCTION NEWS

Volume II, Number 1 **Otis Engineering Corporation • Dallas** *Production Equipment and Services*


Pos. 5 – 2" S Nipple
Pos. 4 – 2" S Nipple
Pos. 4 – 2" S Nipple
2' Flow Couplings
Pos. 4 – 2" S Nipple
Pos. 3 – 2" S Nipple
Pos. 3 – 2" S Nipple
4' Flow Couplings
Pos. 3 – 2" S Nipple
Pos. 2 – 1½" S Nipple
15' - 2" Blast Nipple
ZONE #5
15' - 1½" Blast Nipple
2" Polished Nipple
1½" Polished Nipple
2" Type A Otis Sliding Side-Door
1½" Type A Otis Sliding Side-Door
ZONE #4
Pos. 1 – 1½" S Nipple
Pos. 2 – 2" S Nipple
20' - 1½" Blast Nipple
20' - 2" Blast Nipple
1½" Polished Nipple
ZONE #3
2" Polished Nipple
Pos. 1 – 2" S Nipple
40' - 2" Blast Nipple
ZONE #2
2" Polished Nipple
2" Type A Otis Sliding Side-Door
7⅝" – 33.70# Casing
2" J Nipple
ZONE #1
T.D. of well 13,000'

Copyright 1960 Otis Engineering Corporation

Alternate Zone Triple Completion Shows Economic Advantages of Using Otis Equipment and Wire Line Services

LAFAYETTE — This offshore, multiple-zone gas well, located off the coast of Southern Louisiana, illustrates the economic advantages of using Otis sub-surface flow control equipment and wire line services.

The cost of the installation, including the tubing safety valves, sleeves, nipples, and other Otis sub-surface equipment as shown in the accompanying diagram, totaled slightly under $12,000 — or about $65,000 less than what it would cost to move a workover rig onto the well to deepen it and recomplete the lower zones, had the well been drilled and completed differently. As equipped, this well can be produced until all five zones have been depleted, with only occasional wire line service to permit production from each of the different zones.

T.D. of the well was approximately 13,000 feet with five different zones of potential production below 12,600 feet. When called to engineer the completion, Otis specialists were asked to design an installation that would permit alternate production of three of the zones through the long string and one through each of the other strings, or two zones through the long string and two through the intermediate string, with the top zone to be produced through the short string.

Two single packers were used to isolate zones 1 and 2 and a Type A Otis Sliding Side-Door and Type J Otis Landing Nipple were made up in the tubing between the two packers. This arrangement will permit the bottom zone to be produced first through the long string, and then zone 2 by setting a Type PJ Otis Plug Choke in the landing nipple and shifting the sleeve in the Sliding Side-Door®. The Type PJ choke is designed to hold pressure from either direction.

A blast nipple with a Position 1 Type S Otis Landing Nipple above and a polished nipple below was designed into the long string opposite zone 3. This is the zone to be produced through the intermediate string. In the event flow from zone 3 should cut through the blast nipple, the landing nipple and polished nipple will be used to pack off the hole and permit continued production of either of the lower zones through the long string. The landing nipple above the blast nipple may also be used to land a plug choke in the event both lower zones deplete sooner than anticipated and the operator decides to produce zone 4 through the long string.

Otis sliding side-doors were designed into both the intermediate string and the long string between the packers isolating zone 4. This will permit selective production of that zone through either string of tubing. S nipples, blast nipples, and polished nipples were also made up on both the intermediate and long strings opposite zone 4 to provide the tubing with the same protection as described for zone 3.

In that this was a gas well, S nipples with flow couplings above and below were made up in all three strings of tubing, immediately above the top packer, to accommodate Type FS Otis Tubing Safety Valves. This provided Storm Choke® protection for each string. By locating the safety valves just above the top packer, the operator will be able to carry on a corrosion inhibitor program without pulling the safety valves. S nipples were also located in each string approximately 1,500 feet from the surface for plugging purposes until gathering lines could be laid.

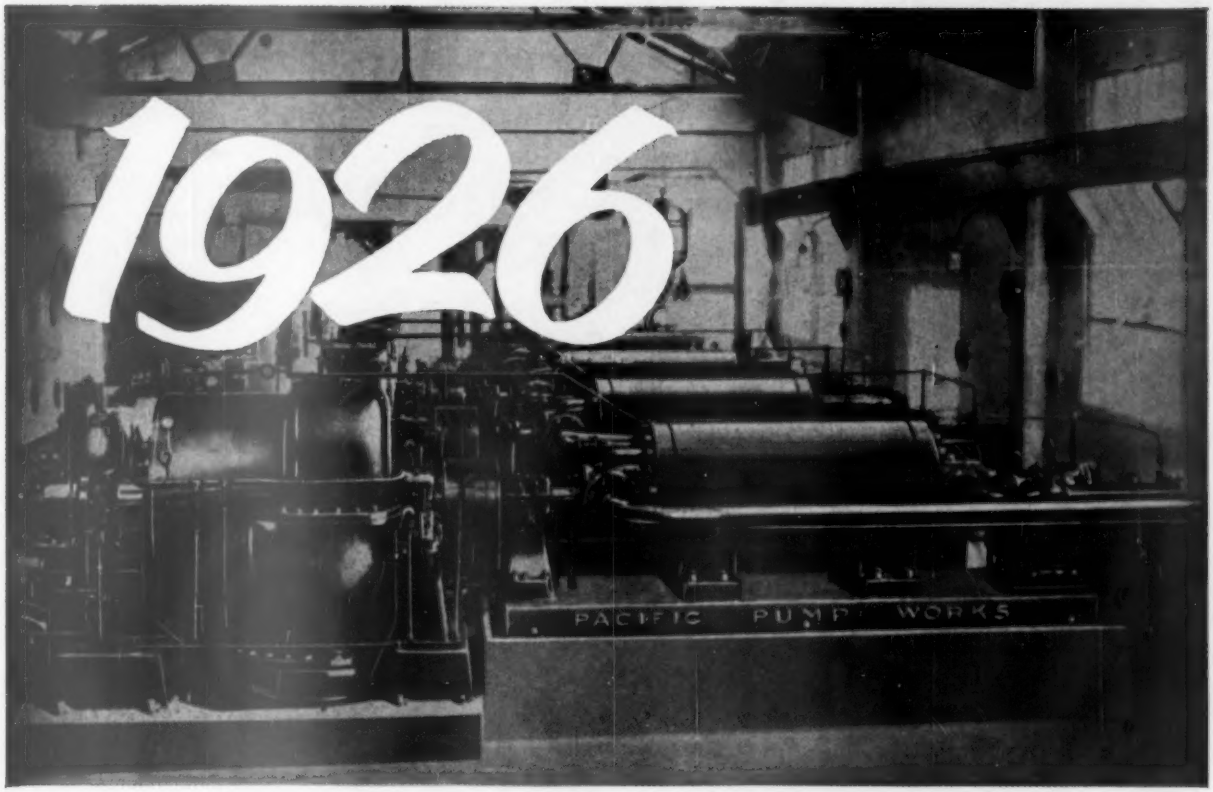
This Otis-engineered completion was designed to provide the ultimate in economical, versatile, and efficient alternate-zone production. For more information on alternate-zone, multiple completions or for help with any other specific completion problem, call the Otis office nearest you or write Otis, Dept. 1-W, Box 35206, Dallas 35, Tex. Experienced Otis specialists are ready and anxious to provide you with a "packaged" well completion service.

OTIS

Engineering Corporation

General Offices:

6612 Denton Drive • Dallas, Texas



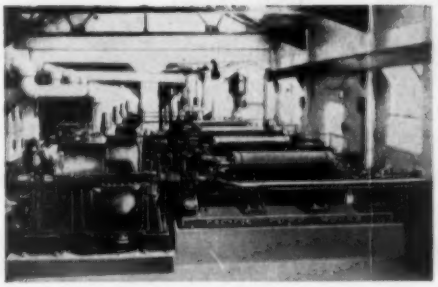
PACIFIC PUMPS

first "FIRST"

The centrifugal pumps designed and built for Pan American Oil Company's new high-pressure cracking process in 1926 was one of the most significant engineering achievements of the Twenties in the refinery processing field. The first of many Pacific Pumps' "FIRSTS", this particular pump was the forerunner of today's greatly improved Pacific centrifugal process pump line. Over the years Pacific has built and installed thousands of vertical and horizontal centrifugal pumps for extreme pressures and temperatures demanded by the petroleum, chemical, petro-chemical and allied industries. In addition, Pacific designs and manufactures boiler feed pumps for the power industry, steam turbo-pumps for the marine and power generation fields, and plunger pumps for oil-well service.

This first Pacific advertisement appeared in several petroleum publications early in 1927

2000 POUNDS PRESSURE WITH CENTRIFUGAL PUMPS



View of recent installation of four "PACIFIC" Multi-stage Pumps at Pan American Petroleum Company Refinery, Los Angeles. Each Pump delivers a capacity of 400 Gallons Per Minute of Oil against a pressure of 2000 pounds. Pumps are driven by 750 H. P. Steam Turbines. Each Pump weighs nine tons and was required to pass a hydrostatic test of 5000 pounds pressure.

We are prepared to make prompt shipment of Booster Pumps for Pipe Line or High Pressure service. Special Pumps designed for unusual conditions.

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350 Bicket Street Huntington Park Los Angeles, Cal.

Write for **Bulletin 1C**

PACIFIC®

Offices in all Principal Cities

PACIFIC PUMPS

Inc... A Division of Dresser Industries, Inc.

HUNTINGTON PARK, CALIFORNIA

Repeat purchases —the best endorsement for Polyken

1956 INSTALLATION, Chester to Bellwood, Va., 4.5 miles of 6" pipe

1960 INSTALLATION, Boswell's Tavern to Gum Spring, Va., 26.7 miles of 18" pipe

Commonwealth Natural Gas makes repeated use of Polyken® tape on strength of past performance

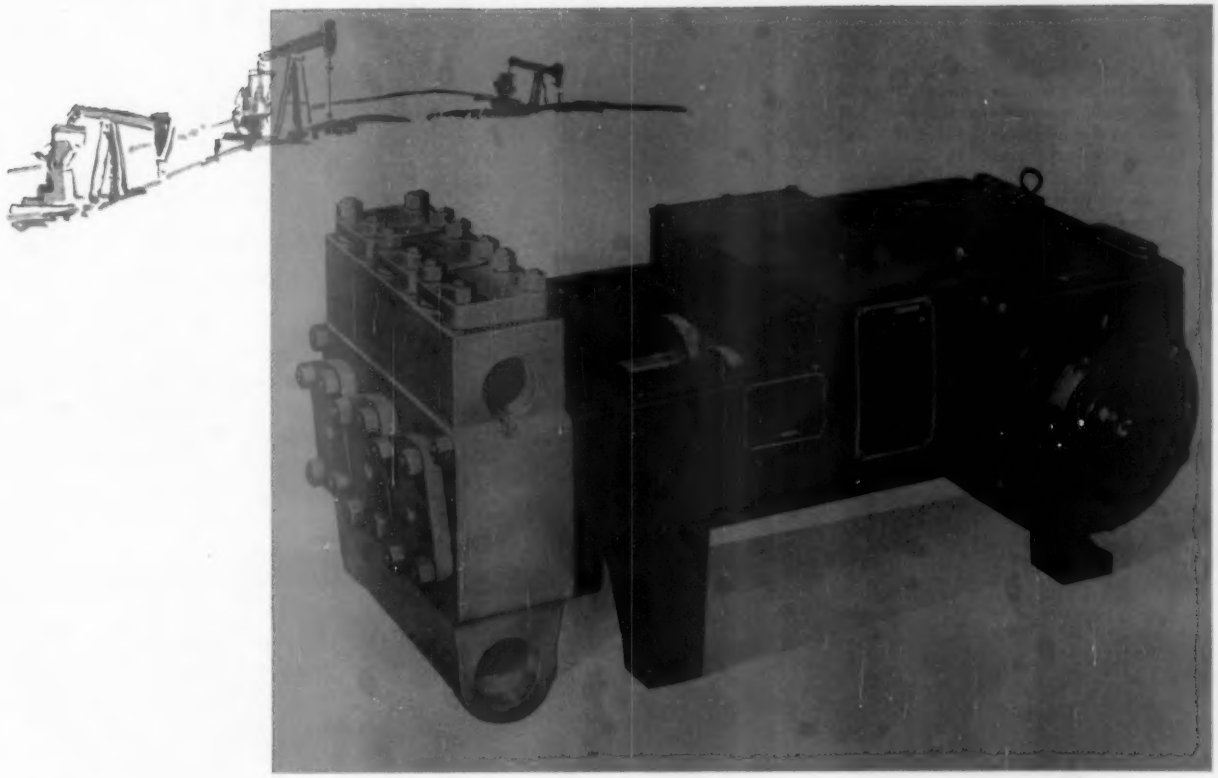
Officials of Commonwealth Natural Gas Corporation of Richmond, Va., were impressed in 1956 with the many advantages of Polyken protection. With confidence based on the cathodic protection needs of their Polyken tape-coated 1956 Bellwood line (*inset photo*), they put this coating to work two years later on their Chester to Petersburg, Va., line (12 miles of 18" pipe). In 1959, *more* Polyken coating . . . Waverly to Ivor, Va., (15.8 miles of 12" pipe). And most recently, the line from Boswell's Tavern to Gum Spring (*main illus.*).

It stands to reason that repeated use is founded on first-hand satisfaction and trust. Many discriminating companies make Polyken protection their standard specification because of its dependable performance. Get full details on Polyken performance and economy from your representative, or write Polyken Sales Division, 309 West Jackson Boulevard, Chicago 6, Illinois.

Polyken

EXPERIENCED IN PROTECTIVE COATINGS

THE KENDALL COMPANY
Polyken Sales Division



"Oilwell's" 3-inch stroke plunger pump is just right for small waterfloods!

The A-323 Triplex Plunger Pump is of sturdy, horizontal, three-cylinder, single-acting construction. It is specifically developed for small waterflood and salt water injection programs.

Compact aluminum-bronze fluid end is designed with double suction and discharge connections. Removable stuffing boxes accommodate plunger sizes from 1¼ to 2½ inches for working pressures from 3,000 to 815 psi. It is equipped with stainless steel plate-type valve service with nylon or stainless steel discs.

The power end is a high-strength cast-iron frame with integral cross-head guides. Crankshaft is mounted in shim-adjustable tapered roller bearings.

You can get more information about this 3" stroke, 50 hp plunger pump, including specifications and performance data, at your nearest "Oilwell" store or from your "Oilwell" representative.

USS and "Oilwell" are registered trademarks

USS **Oil Well Supply Division of United States Steel**

Executive Offices—Dallas, Texas
Export Offices—30 Rockefeller Plaza, New York 20, N. Y.

NOT EVERY TIMEPIECE HAS 21 JEWELS

You couldn't wear this or hang it on the wall, but at 2,000 or 20,000 feet underground there's nothing better. This clock gives you precise timing for the most accurate drill stem test record available. It's an important part of the Johnston "T" and "M" recorders. Ever hear of them?

No Swiss watch could be more accurate than these recorders. Just to give you an idea: plus or minus 1/3rd of 1% variation in high well temperature and pressure. Pressure changes of 2½ pounds are clearly visible on Johnston charts, 3 times bigger than other D.S.T. charts.

Here's why you get recordings that assure the most accurate interpretation possible — a special, pre-heat-set clock spring for consistency, teflon piston seal for friction-free travel, high unit deflection for preciseness and a spring mechanism that won't break under pressure.

One Johnston recorder was purposely dropped more than 1,000 feet. Bull nose was broken but the recorder still worked properly. Another example why Johnston equipment gives an accurate account of your well.
Think about it, then call us.

JOHNSTON TESTERS

Houston, Texas • Calgary, Canada

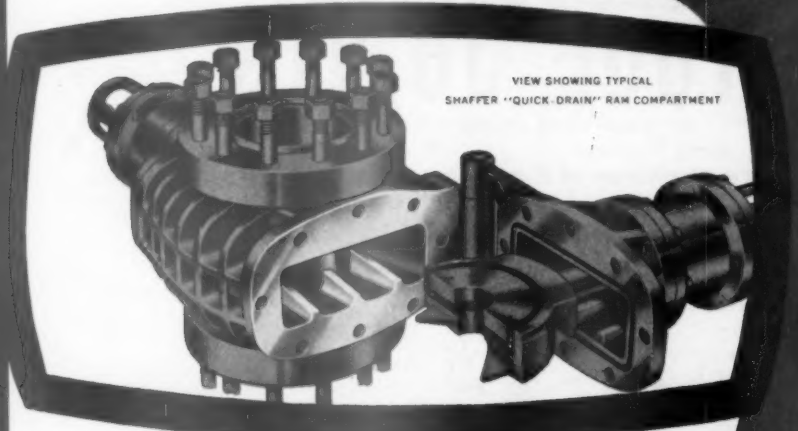
When Buying Blowout Preventers

Why take *less* than

SHAFFER'S "QUICK-DRAIN" RAM COMPARTMENTS?

When drilling for oil or gas—particularly with conventional mud circulation—it is very important that the Blowout Preventer be designed so that no detrimental sand, cuttings or mud can accumulate in the ram compartments to interfere with quick, positive ram operation when pressure emergencies threaten.

There are no problems with such accumulations when you use Shaffer Blowout Preventers. HERE'S WHY...



VIEW SHOWING TYPICAL SHAFFER "QUICK-DRAIN" RAM COMPARTMENT

"Quick-Draining" Ram Compartments are just one of many extra advantages you get in ALL FOUR types of Shaffer Blowout Preventers...

TYPE B for general drilling where the extra compactness of *non-rising* locking shafts is preferred!

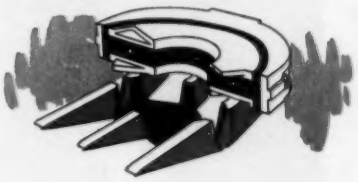
TYPE E for general drilling where the quick ram indication of *rising* locking shafts is preferred!

TYPE XHP for *extra-high* pressure drilling—to 15,000 PSI *Working* Pressure in 7-1/16" Bore Size...to 10,000 PSI *Working* Pressure in 9" and 11" Bore Sizes!

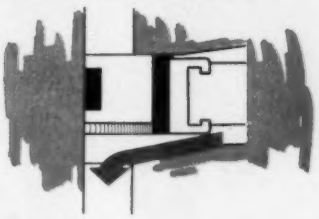
TYPE LWS for operation where a compact, lightweight, hydraulically-operated gate is desired (weighs only 780 lbs. in 7-1/16" Bore Size)!

THERE IS NO BETTER BLOWOUT PROTECTION than SHAFFER protection. Why not get the full story on Shaffer advantages from your nearest Shaffer representative? Or write direct!

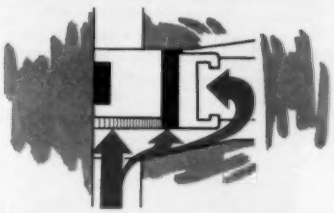
▼ ***In Shaffer Blowout Preventers the rams travel on guide ribs high above the compartment bottoms. These ribs are narrow, reducing to a minimum any chance of mud or sand gathering on the sliding surfaces. Furthermore, the little that might collect on these narrow ribs is quickly and easily wiped off by the rams as they open or close!***



▼ ***Then note the compartment bottoms. These are steeply-sloped downward toward the well so that any sand and cuttings that might normally settle in the compartment area are quickly drained back into the well.***



▼ ***The more-than-ample clearance between the bottom of the rams and the compartment bottoms also provides another important advantage ...should pressure build up in the well, this pressure can quickly and freely flow to the back of each ram to balance the pressure against the front face for easy closing action.***



Therefore the unique "Quick-Drain" design of Shaffer Preventers:

(1) prevents detrimental accumulation of mud, sand and cuttings within the ram compartments.

(2) assures pressure balance between the front and back of each ram as the rams are closed.

***Result*—whenever pressure emergencies threaten, neither mud, sand nor well pressure interferes with fast ram closure when you are using Shaffer equipment!**

SHAFFER

37 years OF OIL TOOL LEADERSHIP

HIGH PRESSURE DRILLING AND CONTROL EQUIPMENT • FISHING TOOLS THAT EXCEL

CALIFORNIA SERVICE SHOPS: Santa Fe Springs, Santa Maria, Ventura, Avenal, Bakersfield and Taft
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FARMINGTON, NEW MEXICO, Shaffer Tool Works, Post Office Box 546
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EXPORT SALES OFFICE: Shaffer Tool Works, 500 Fifth Avenue, New York, N.Y., U.S.A.
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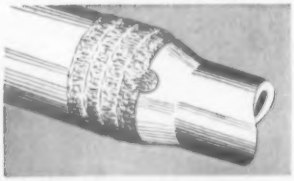
Why you should specify

AMERICAN IRON

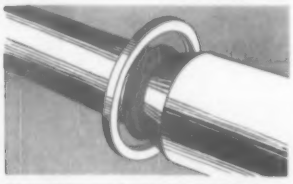
Flash Welded TOOL JOINTS

on your next string of drill pipe!

Here are three of the many reasons why you buy QUALITY when you specify AMERICAN IRON.



1. TUNGSTEN CARBIDE Hard Metal Bands are available on all American Iron Tool Joints. They are applied PRIOR to heat treatment which eliminates chipping, rapid wear and does not affect the physical metallurgy of the tool joint.



2. The "WEDDING BAND": a heat treating process used by AMERICAN IRON, which more than *doubles* the tensile-impact strength of the Flash Welded connection.

3. The REFLECTOSCOPE is a new electronic testing apparatus used by AMERICAN IRON for inspecting the weld zone for inclusions and defects. This assures you of *maximum performance* from your string of Flash Welded Tool Joints.

Specify Flash Welded OPEN-HOLE Tool Joints for your Lightweight Drill Pipe.

AMERICAN IRON

Another AMF Product PETROLEUM EQUIPMENT

AMERICAN IRON & MACHINE WORKS COMPANY, INC.
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They Say—

New binding is best

Dear Sir:

Just wanted you to know I, for one, appreciate the new slotted binding and larger type in the Journal.

Walt Hunter
Gulf Oil Corp.
Philadelphia

Dear Sir:

Just a note to let you know how much I liked the new binding on the Big Yellow Book. It can now be used on a desk and it will lie flat. Also, to tear out an article (of an extra copy, of course) is very simple and neat.

Thanks for changing. I wish other publishers would do the same.

Carrie W. Eagon, Librarian
Jersey Production Research Co.
Tulsa

What's LACT?

Dear Sir:

In your January 9 issue (p. 65) you published an article on LACT. This was a very interesting and informative article, but it left most of us in my office with one question in mind—what does LACT mean?

We are in the design business and are not production people and perhaps should not be reading articles which are obviously meant for those whose familiarity with this branch of industry would make them knowledgeable of the slang and abbreviations peculiar to that industry.

We would very much appreciate a definition of LACT to check the numerous phrases which have occurred to us to match the initials.

F. N. Scott
Bechtel Corp.
San Francisco

Dear Sir:

We like your new binder.

In your survey of January 9, pages 65-69, you should have included an English translation of LACT. It's a case of watching the forest and forgetting the trees. Though many of us have been con-

stant readers of OGJ for years, we still need spelling out for our average reader, no?

H. P. Nagel
Iroquois Gas Corp.
Buffalo

Yes. LACT is short for lease automatic custody transfer. This is a method of accurate measurement and recording of oil produced on a lease and delivered automatically to a pipeline company. Pardon our jargon.—Ed.

Small error, big difference

Dear Sir:

Your presentation of my article, "Will Corrosion Eat Up the Water-Flood Profit," (OGJ, Jan. 16, p. 76) is very good. Use of the picture in the lead spot makes the article very attractive. Your change to larger type also makes your articles more readable.

There is one small error in the printed version that I would like to call to your attention. The first sentence in the last paragraph of the article (p. 79) should read: "Again, bacteria counts have remained low, and **no** scale or slime accumulation is noted."

The "no" was left out.

L. C. Case
Tulsa Consultant

Critical months

Dear Sir:

The shocking increase in refinery runs must alarm everybody in the industry. Of vital and continuing importance during 1961 will be the rate of refinery operations.

It is a shame that the most effective break in the tendency to operate reserve refinery capacity has required state regulatory bodies to exercise a firm control over the supply of crude oil.

When refinery runs drop below 8 million barrels daily, refinery profits begin to return to normal and begin to offset reduced income to the companies from lower production.

January, February, and March are critical months. If refinery runs stay down, product inventories will stay in balance and products on the over-all picture can be maintained.

There is plenty of product supply around to take care of any unexpected surge of cold weather. It is a lot more profitable to buy temporary requirements than to increase refinery runs, especially in view of high gasoline inventories.

M. Lloyd Freese
Bell Oil & Gas Co.
Tulsa

OGI will fill a gap

Dear Sir:

I should like to express my appreciation for the copy of Oil and Gas International.

I feel this new periodical fills a real gap in the European refining world, and to my mind, it fills it in excellent style.

I found the Journal easy to read, well balanced in content, and the articles interesting, informative, and very well prepared.

May I wish you the success with your new Journal which I am quite certain you will obtain if the standard you maintain is that of your first number.

P. Laister
Assistant Refinery Manager
Esso Petroleum Co., Ltd.
Fawley refinery.

This announcement is not an offer of securities for sale or a solicitation of an offer to buy securities.

New Issues — January 18, 1961

Texas Eastern Transmission Corporation

$30,000,000 First Mortgage Pipe Line Bonds, 5% Series due 1981

150,000 Shares Preferred Stock, 5.52% Series

(Par Value $100 Per Share)

Prices:

100% for the Bonds

$100 per share for the Preferred Stock

plus accrued interest on the Bonds from January 1, 1961 and accrued dividends, if any, on the Preferred Stock from date of issue

Copies of the prospectus may be obtained from such of the undersigned (who are among the underwriters named in the prospectus) as may legally offer these securities under applicable securities laws.

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The First Boston Corporation — Kuhn, Loeb & Co.

Blyth & Co., Inc. — Eastman Dillon, Union Securities & Co. — Glore, Forgan & Co.

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Lehman Brothers — Merrill Lynch, Pierce, Fenner & Smith Incorporated — Smith, Barney & Co. Incorporated

Stone & Webster Securities Corporation — White, Weld & Co. — Dean Witter & Co.

Letters to They Say should be addressed to The Editor, The Oil and Gas Journal, Box 1260, Tulsa, Okla.

CALENDAR

JANUARY

30-Feb. 9 University of Illinois, annual quality control short course, Urbana, Ill.

FEBRUARY

2 Petroleum Equipment Suppliers Association, south Mid-Continent district meeting, Statler Hotel, Dallas.

7 Petroleum Equipment Suppliers Association, Gulf Coast district meeting, Shamrock-Hilton Hotel, Houston.

7-8 University of Oklahoma, School of Petroleum Engineering, advanced petroleum engineer seminar, University of Oklahoma, Norman.

8-10 Southwestern Legal Foundation, twelfth annual institute on the law of oil, gas, and taxation, Southwestern Legal Center, Dallas.

9-10 API Committee on Public Affairs, New Orleans regional conference on employe communications, Roosevelt Hotel, New Orleans.

9-11 National Society of Professional Engineers, winter meeting, Hotel Fort Des Moines, Des Moines, Iowa.

14 Petroleum Equipment Suppliers Association, eastern district meeting, Duquesne Club, Pittsburgh.

14-15 National Association of Corrosion Engineers, Shreveport, La., section, short course, Centenary College, Shreveport.

15-16 Western Petroleum Refiners Association, Gulf Coast regional technical-industrial relations meeting, Rice Hotel, Houston.

16 API Committee on Public Affairs, Dallas regional conference on employe communications, Sheraton-Dallas Hotel, Dallas.

18 Purdue University, business history conference, "Management Decisions Under Government Regulation," Memorial Union, Purdue University, Lafayette, Ind.

20-Mar. 11 Advanced Drilling Practices Course for Engineers, University of Oklahoma, Norman.

23-24 Oklahoma State University, natural gas conference, Stillwater, Okla.

24 Natural Gasoline Association of America, South Louisiana regional meeting, Lafayette Petroleum Club, Lafayette, La.

26-Mar. 1 American Institute of Chemical Engineers, petrochemical and refining exposition, Municipal Auditorium, New Orleans, and national meeting, Hotel Roosevelt, New Orleans.

26-Mar. 2 American Institute of Mining, Metallurgical, and Petroleum Engineers annual meeting, Chase and Park Plaza Hotels, St. Louis.

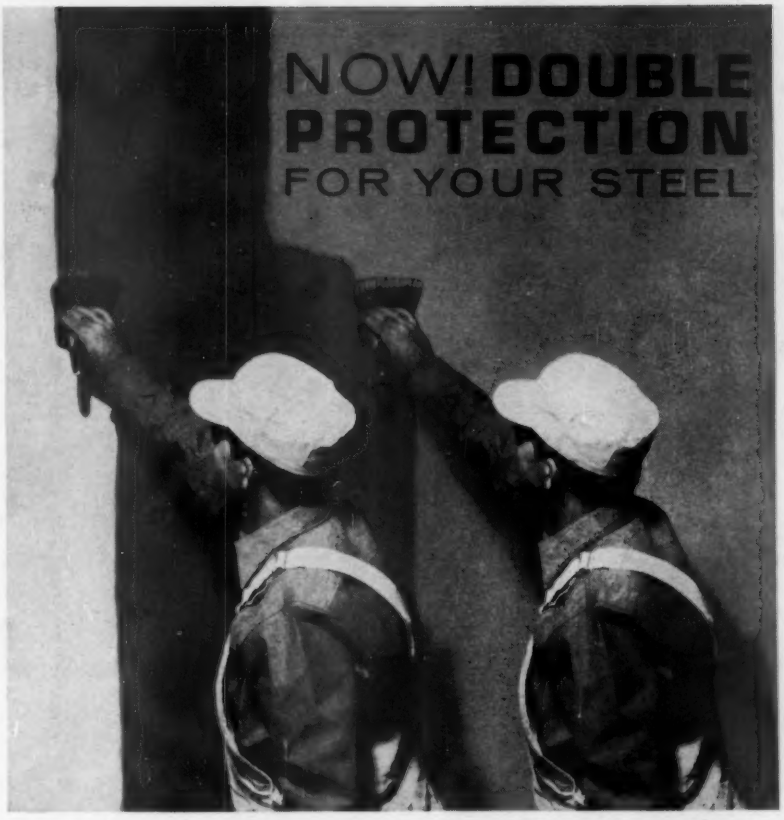
27 Canadian Society of Exploration Geophysicists, conference on exploration geophysics—today and tomorrow, Palliser Hotel, Calgary.

28-Mar. 1 API Committee on Public Affairs, New York regional conference on employe communications, Park-Sheraton Hotel, New York City.

MARCH

2 Petroleum Equipment Suppliers Association, north Mid-Continent district meeting, Mayo Hotel, Tulsa.

3 Ohio Oil and Gas Association, winter



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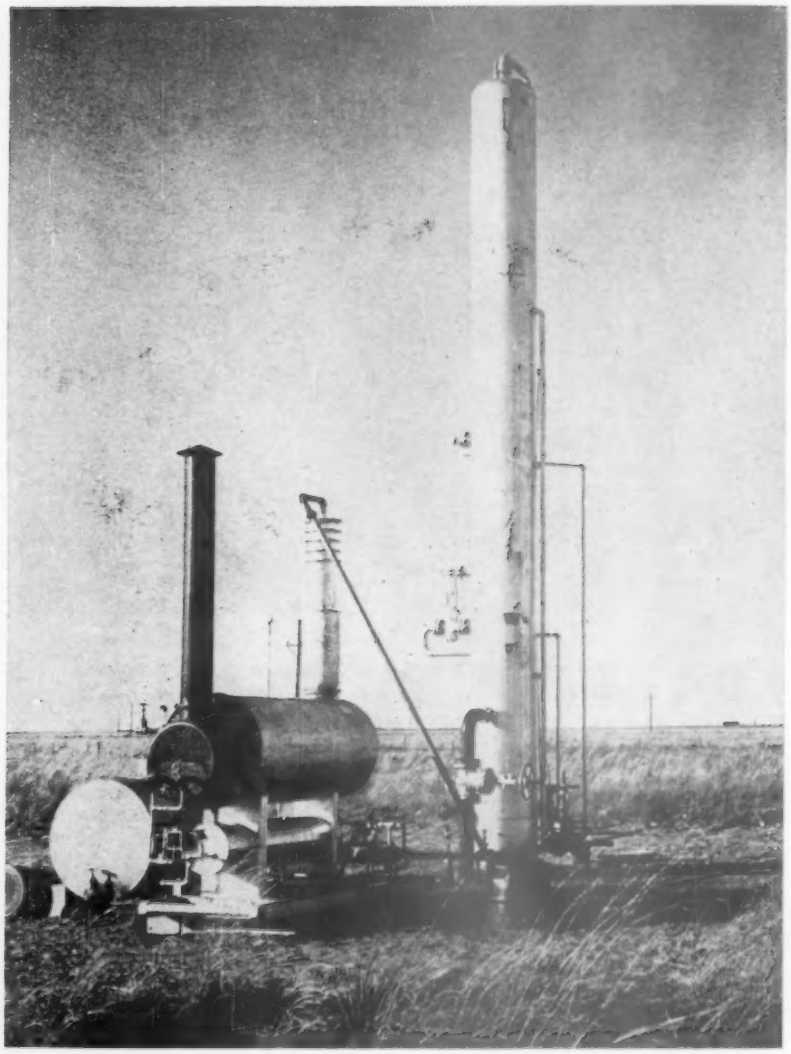

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meeting, Deshler Hilton Hotel, Columbus.

5-9 American Society of Mechanical Engineers, gas-turbine power division, and U. S. Department of Defense, annual gas-turbine conference and products show, Shoreham Hotel, Washington.

7 Petroleum Equipment Suppliers Association, Pacific district meeting, Ambassador Hotel, Los Angeles.

7-8 University of Oklahoma, School of Geological Engineering, seventh biennial geological symposium, Student Union Building, University of Oklahoma, Norman.

8-9 API Committee on Public Affairs, Chicago regional conference on employe communications, Sheraton-Towers Hotel, Chicago.

8-10 American Petroleum Institute, Division of Production, southern district meeting, Captain Shreve and Washington-Youree hotels, Shreveport, La.

13-16 Kentucky Petroleum Marketers Association, sixth management institute, conducted by the University of Louisville, Brown Hotel, Louisville.

13-17 National Association of Corrosion Engineers, annual meeting and corrosion show, Hotel Statler, Buffalo, N. Y.

15-17 Natural Gasoline Association of America, annual convention, Baker Hotel, Dallas.

16-17 International Oil and Gas Educational Center, study of the economics of petroleum exploration, development, and property valuation, Southwestern Legal Center, Dallas.

21-23 American Power Conference, twenty-third meeting, Sherman Hotel, Chicago.

21-30 American Chemical Society, 139th annual meeting, Kiel Auditorium, St. Louis.

22-24 American Petroleum Institute, Division of Production, southwestern district meeting, Cole Hotel, Albuquerque.

23 National Industrial Conference Board, general session, Shamrock-Hilton Hotel, Houston.

27-28 University of Wichita, School of Engineering, third annual production institute, university campus, Wichita.

27-29 Midwest Gas Association, annual meeting and convention, Sheraton-Fontenelle Hotel, Omaha.

27-31 Instrument Society of America, symposium on temperature measurement and control in science and industry, Veterans Memorial Auditorium, Columbus, Ohio.

28-29 University of Oklahoma, Schools of Petroleum and Gas Engineering, gas conditioning short course, Oklahoma Memorial Union Building, University of Oklahoma, Norman.

APRIL

4-5 University of Kansas, gas compressor Institute, Liberal, Kans.

5-6 Third annual symposium on pilot plant and process automation, Ambassador Hotel, Los Angeles.

5-7 American Petroleum Institute, Division of Production, Mid-Continent district meeting, Mayo Hotel, Tulsa.

6-7 University of Oklahoma, School of Mechanical Engineering, short course on industrial engines, University of Oklahoma, Norman.

7-9 American Institute of Mining, Metallurgical, and Petroleum Engineers, Southwestern Alaska Chapter, sixth annual mining, minerals, and petroleum conference, Anchorage, Alaska.

OKLAHOMA OPERATOR ESTIMATES $7,000 SAVINGS ON 19,600-FOOT WORKOVER!

And the Service Contractor made a fair profit, too!

"This modern drive-in rig saved us almost $200 per day on day work costs, plus $1,000 on moving and rig-up costs," says Mr. Jack Ross, Production Superintendent for Kenneth A. Ellison. "We waited over two weeks for the rig we wanted, a Cardwell KM250. We'd watched these rigs closely for several months and had no doubts about putting one on this tough job. The KM250 is as fast as any conventional drilling rig normally used for this deep work, and it's much more economical. On this job, the KM250 proved its superior performance and overall job economy. Because of this, we'll be using this rig a lot in the future."

The job was performed on the Miller-Long #1, which was originally drilled to 19,634 feet. On the last trip out of the hole, the 19,600 feet of pipe was pulled and on the bank in just over 8 hours, including time to change elevators. There were no breakdowns on the job which lasted 31 days, including moving, rig-up and rig-down time.

More and more operators are finding that Cardwell Drive-In Rigs save them time and dollars on completion, servicing and workover, and perform outstandingly on medium depth drilling. Contractors who own Cardwell Drive-In Rigs are continually meeting the challenge of tougher, more complex jobs, and still making a good profit for themselves. You can, too! Call a Cardwell representative today!

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Production Superintendent,
Kenneth A. Ellison.

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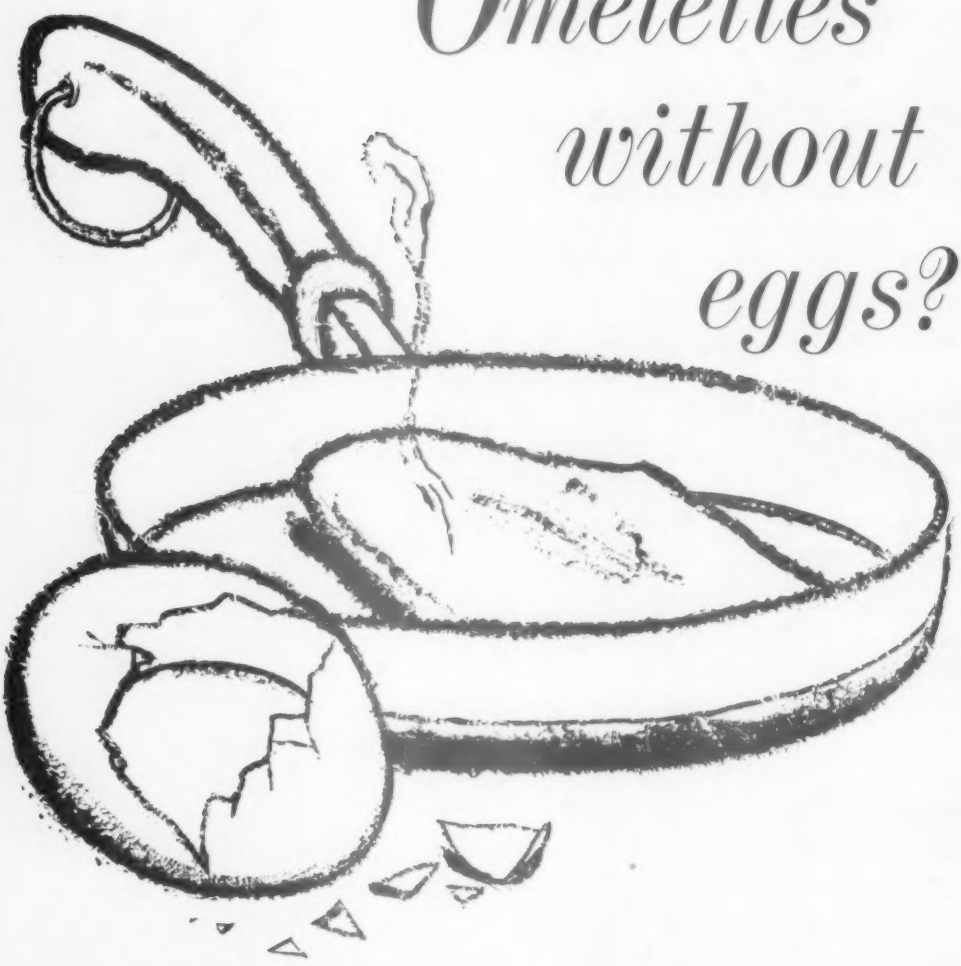
Number 2 of a Series

TELL THIS PETROLEUM INDUSTRY FACT TO YOUR NEIGHBOR

Omelettes without eggs?



Omelettes without eggs? You might as well ask for natural gas without oil . . . for the fuel that burns in thirty million American gas ranges is produced by the *oil and gas industry*. Natural gas was once like experience: you found it only when you were looking for something else. Today, in some communities, the household demand for natural gas is greater than available distribution . . . even though industry capacity has been doubled in the past ten years to supply consumer and industrial demand for this modern fuel.

A healthy national economy requires that the petroleum industry locate new gas reserves, drill more gas wells and build more pipelines. Percentage depletion assures the petroleum industry of the "seed corn" that guarantees the future gas and oil needed to meet the ever increasing demands of America's homes and industries.

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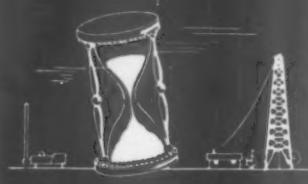


the Journal said...

50 years ago

February 2, 1911

George W. Barnes, leading Oklahoma independent oil operator and producer, dies in Monte Carlo, Monaco, while on a vacation trip after disposing of all his oil holdings to Prairie Oil & Gas Co. for $3,000,000 in one of the state's largest oil deals. His home was at Muskogee.

Twenty steamers have been chartered to load a record-breaking oil export shipment of more than 1,000,000 cases of refined petroleum at Philadelphia destined for ports in China, Japan, New Zealand, and Australia.

Daily production of booming new Vinton field, in southwestern Louisiana, soars to the high figure of 26,500 bbl., 4½ times greater than that of all other Gulf Coast fields put together. Next field in daily output is Markham with 4,200 bbl.

25 years ago

January 30, 1936

Annual review number of The Oil and Gas Journal pictures 1935 as most active year since 1929. Completion of 21,420 wells reported, an increase of 3,224 wells over previous year. Oil production totals 990,620,775 bbl., up 37,516,522 bbl. from that of previous year.

Pure Oil Co. launches $1,000,000 refinery-construction program in remodeling and replacing old equipment and adding new facilities at its Toledo and Cabin Creek, W. Va., plants.

For first time in three years, East Texas ships more oil by pipeline than it produced. Long period of overproduction and chaotic market conditions believed ended.

10 years ago

February 1, 1951

Petroleos Mexicanos (Pemex) lays first coast-to-coast pipeline in Western Hemisphere, extending from its Minatitlan refinery on the east coast to Salina Cruz, on the West Coast. The new 155-mile 10-in. line will transport initially 15,000 bbl. of gasoline, kerosine, and diesel oil daily, releasing more than 200 tank cars for other services.

New $4,000,000 Thermofor catalytic cracking plant goes on stream at Standard Oil Co. of Ohio's No. 1 refinery at Cleveland. Its completion marks another step in the company's $100,000,000 expansion and modernization program. The unit is the tallest industrial structure in Ohio.

I. P. LaRue opens Piston Ridge field in Forrest County, Mississippi. Major gas-condensate producing area (Pistol Ridge-Maxie) indicated.

JOURNALLY SPEAKING

The Barrel Balancer

THE OUTWARDLY CALM and obviously well-balanced gentleman in the above picture is the Journal's Economics Editor, John C. Casper, in the midst of his spectacular barrel-balancing act.

Note how he is surrounded by the essential accounterments of his profession: reams of reference statistics, a sharp pencil, an electric calculator, and—for inspiration when all else fails—a picture of a crystal ball hanging on the wall over his desk.

All the statistics in this annual Review and Forecast issue were compiled under his supervision. And there were times in the course of this chore when a less calm individual would have lost his balance irretrievably—like when one of his assistants forgot that 1960 was Leap Year and computed some daily averages with only 90 days in the first quarter. (It took John half a night to restore balance there.)

John's biggest original contributions to this issue are the two principal forecasts—the forecast of drilling on pages 106-107, and the forecast of supply and demand on pages 134-135.

The drilling forecast gets more attention from most readers, but for our money the supply-demand forecast is the most significant and useful feature in this annual issue. It can serve as a guide to operations throughout the year, and a check of actual happenings against the forecast performance will show what adjustments ought to be made from time to time.

To make this forecast, John talked personally with most of the economists for major oil companies and industry associations, gathered all their published and private data, and then weighted them with his own good judgment. So we will wager that, on the demand side, this is as good a forecast as can come out of anybody's crystal ball.

But on the supply side John had to put down what he guesses producers and refiners will do rather than what he knows they ought to do to bring about a better balance of supply with demand. The forecasts of production, imports, and refinery runs are what probably will happen rather than "desirable" goals.

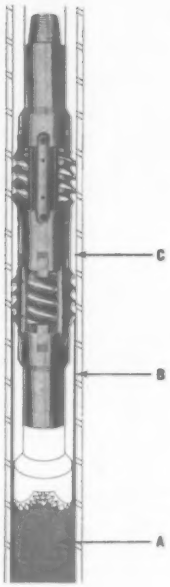
You may not be aware of it, but a supply-demand table like this has to balance to the last barrel, just like a bank audit. Any differences between supply and demand have to be accounted for by stock changes.

John made his barrels balance. Now, as the year progresses, we will see how well the industry succeeds in balancing its barrels. And as inexorably as in the table, any lack of balance will show up in stock changes.

So if stocks get too high the industry will have to take steps to restore balance. John couldn't change supply figures to get a balance. But operators can.

—Henry D. Ralph.

your WELL'S FUTURE LOOKS GOOD when the "WORKING SURFACE" of the CASING is CLEAN!



A – Cement to be drilled out.
B – This thin cement sheath, which remains after the bit has passed, often interferes with future operations.
C – Cement sheath and ALL other obstructions removed by the Baker ROTO-Vert Casing Scraper. The vital I.D. of the casing is left clean and smooth, safe for all future down-hole operations.

It's simple and inexpensive to run a Baker Casing Scraper just above the bit when drilling out cement, or following perforating operations, to provide a bright future for your well.

No obstructions will remain to cause premature setting of close-tolerance tools. Rust, mill scale and paraffin will be scraped away, and there will not be any sharp burrs to slash and ruin swab rubbers or affect the performance of packing elements on testers, packers and cement retainers. Even the thin, brittle cement sheath which prevents the slips of pack-off tools from gripping the casing, are scraped away.

Thousands of runs have proved the Baker ROTO-VERT Casing Scraper to be both positive and safe in cleaning up casing I. D. easily and at low cost.

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The key to 1961 is careful management

THE OUTLOOK is pretty good for most divisions of the petroleum industry during 1961.

Increases over 1960 will be relatively small, but nevertheless the year should see new all-time highs in domestic demand for all petroleum products and for most of the individual components; in refinery runs; and in domestic production of crude oil, natural gas, and natural-gas liquids.

There should also be a new high in producers' income from all petroleum raw materials. Whether or not total income from sale of refined products reaches a new high will depend largely on marketing practices.

THIS OUTLOOK is far more encouraging than the one the industry faced a year ago.

But it is no basis for easy optimism that oil's problems are behind it or that prosperity will come automatically from continued growth in demand.

The fact that the industry's position is so much better today is in large part due to the great strides it made in getting its house in order last year. This good housekeeping must be continued.

The problem of overcapacity is still formidable, and the small increase in demand will not make much of a dent in it. Last year's strenuous measures to prevent oversupply will have to be extended in the face of temptation to relax because of somewhat better market conditions.

Some segments of the industry will remain depressed, impairing the health of the whole. Drilling, for example, is in poor shape. Total completions should increase just a little, particularly in the last half of the year, but marked improvement in the drilling rate cannot be expected until the whole oil industry's income rises appreciably.

Not only drilling but the health of every activity is related to the whole industry's net income. And this depends primarily on the policies and practices in marketing refined products.

Last year top management tackled marketing policies and began weeding out obsolete, unprofitable, and destructive practices. This, coupled with considerable though not universal restraint of oversupply, reversed the downward trend of earnings. Still more of this is needed.

IN SHORT, last year saw a slight improvement in the industry's volume and a big improvement in its attitude and adjustment to conditions. This year will see somewhat greater volumetric improvement.

Whether this increased activity will be a blessing or a curse will depend on whether the managements of big and small concerns continue their newfound policies of adapting to moderate growth in demand.

This will require close attention to statistical forecasts and reports on current conditions, such as this annual Review and Forecast issue of the Journal.

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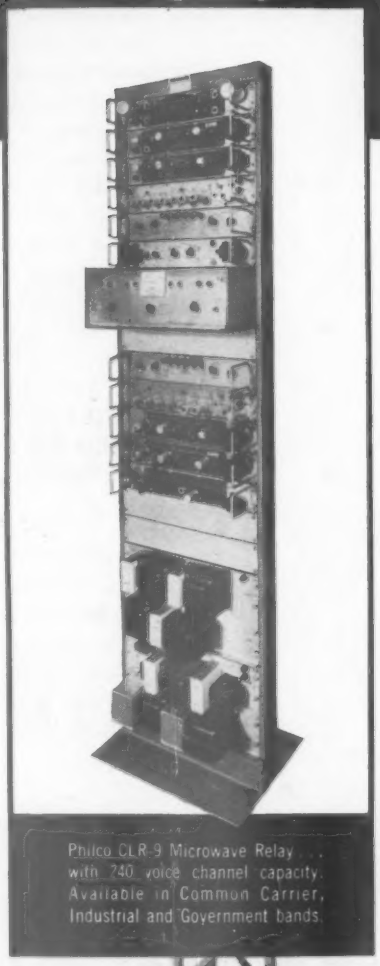

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'61 Looks Promising for Suppliers

• Since inventories are almost exhausted, oil companies will be going to market for tubular goods and other essentials. Even if purchases are held to actual needs and stockpiling slows, some brisk buying is ahead.

BUSINESS is looking up in 1961 for the supply segment of the oil industry.

The big reason: Oil companies have reached the bottom of their supply inventories and will have to buy for current needs this year.

That's the cheering news turned up in a special survey made by Oil and Gas Journal editors in the big supply centers of Tulsa, Dallas, Houston and Los Angeles.

The general inventory position of operators briefly is this: Companies last year depleted their stockpile of tubular goods, bread-and-butter items, and pieces they could trade off to other operators. Bulk of their inventories now consists of low-demand items or equipment that has become less popular because of new field practices.

Most company purchasing agents say they will not be buying this year to rebuild the depleted inventories. Instead, they will buy for actual needs. Even so, there will be a substantial buying upswing compared with the last 2 years.

First to feel this change will be tubular goods. Many companies already are ordering in these lines, and the indications point to the best sales in the last 3 years. The actual volume, naturally, will depend on drilling this year.

Surprisingly, sales of drilling-rig components are running much better than expected in the Dallas area. Some suppliers express surprise and pleasure at increased sales of big components such as draw works.

Since drillers are still not buying complete rigs, supply men feel a trend may be setting in among contractors to beef up or modernize drilling equipment this year.

Outlook for sales of pumping units, sucker rods, and other production equipment is less favorable. They will be static this year, about the same as in 1960.

Buying trends . . . A few changes in buying habits have been spotted.

Most companies are buying lighter and smaller casing. One purchasing agent says frankly he is buying the lightest and cheapest pipe that can be safely used for any function.

Some companies favor buying in-transit mill supplies instead of dealing with supply houses.

A few West Coast operators are buying from mills in the Rockies and Texas rather than relying on eastern suppliers.

Foreign steel, principally Japanese or German, is being bought at a few spots on the West and Gulf coasts, but it still is not a major competitive factor in the domestic industry.

Policy of carrying a big inventory of items has been scrapped in nearly all cases. Most companies now are letting the mills and suppliers warehouse steel goods. Where an inventory is maintained, a 2-month supply now appears to be the going rate.

Brighter in Dallas . . . A decidedly optimistic note was struck by operators in the Dallas area, which reflects activity in North, Central, East and West Texas, and southern Oklahoma.

The purchasing agent of a major firm in Dallas said his company last year lived entirely off inventories. As a consequence, stocks of the most-used tubular goods are almost completely worked off. Only items left in inventory are high-grade, heavy-weight pipe not used very often and special joint material.

The company is just beginning to return to the market to buy tubular goods and will be buying more each month. Drilling activity of this operator is expected to be slightly above last year's rate.

The agent's buying plan underscores one of the new trends. About 75% of his company's oil strings this year will be composed of 4½-in. casing and 25% of 5½-in. casing, except for deep strings in South Louisiana. The ratio, in this case, probably represents a 25% shift toward smaller casing.

This company is not stocking line pipe, sucker rods, pumping units or tanks, but will buy for specific projects. It does have a few surplus pumping units and separator units taken off abandoned wells which will be carried until they can be installed at other locations. In the white-elephant department, the company has a $28,000 high-pressure well-head it bought for a South Louisiana well that didn't produce.

Another big operator reported

Drilling Gets Off to Slow Start This Year

ONE barometer of oil-field activity currently holds little optimism for suppliers and other interests dependent on drilling.

Average number of rotary rigs working in the domestic oil industry for the first 4 weeks of January was the lowest since 1947.

The average was 1,617 rigs compared with 1,596 in 1947.

This slow start emphasizes a downward trend for each January since 1955.

Operators have planned 46,964 wells this year, but are starting off slightly slower than last year when they drilled 46,751 wells.

his inventory is down 50% from last year, with the bulk of the remaining stock consisting of less popular items. He also reported it's getting harder to trade tubular goods with other operators because "everyone now is about down to cats and dogs."

His company will have to buy 75% or more of the tubular goods it uses this year. The purchasing agent plans to fill much of his needs from manufacturers in-transit stocks rather than buying directly from the mill. He also will buy lighter, thin-wall material even for line-pipe installations.

Other operators in Dallas tend to confirm the outlook expressed by the major buyers. Most said their inventories were off sharply in popular items, their trading days with other operators were nearly over, and they would buy this year for actual needs but were looking for the cheaper, lighter-weight goods.

The improved outlook for company buying already is reflected in at least one big supply house's business for January.

"Sales the first month have surprised the hell out of us," reported the sales manager of drilling and production equipment for one big house. "We expected a fairly slow first half this year. But if sales continue at the current rate, 1961 will be a bang-up year. Sales of drilling equipment will be up 5 to 6%.

"We are getting more serious inquiries now on drilling equipment than in the past 4 or 5 months and a substantial number of these are for large rig components, such as draw works."

Different in Houston . . . Outlook also is improved for oil-company buying on the Gulf Coast, where fierce competition among suppliers has brought on some price cutting.

The purchasing agent in Houston for one of the nation's largest operators said his company's inventories have been cut drastically from their record peaks of 1959 and early 1960. He will be in the market this year for nearly every kind of material.

The company policy now: Buy on a hand-to-mouth daily basis. "As a well is readied, we buy for it," he explained. Tubular goods will be needed first, but buying also will be steady for completion and production equipment. He specifically named separators, heater - treaters, pumping units, sucker rods, tank batteries, bits, and mud additives.

Another well-known major says it will step up buying this year for two reasons: Inventories have been reduced to a minimum and its drilling program has been expanded. This company's purchasing agent noted that business should be especially good for gas treaters and other treatment plants.

Other operators reported a similar outlook, and all mentioned the increased price cutting by suppliers.

"Supply houses will make any deal you want them to," said one Houston buyer. "Some are selling at 3% less to compete with foreign steel, which is moving into this area from Europe and Japan. This cut means 50% of the supplier's profit."

The suppliers ruefully admit that price cutting is ruining profits at a time when the outlook is for a slight upturn in business. The Gulf Coast supply industry generally expects an improvement in sales of tubular goods, but little improvement in machinery because of the low number of rigs operating.

Drilling contractors and the majors that drill are still robbing some rigs to keep others running. The practice, now prevalent for at least 2 years, led one supplier to observe: "You just wonder how many workable rigs there are today."

The price cutting among suppliers is taking a toll on commissions — not on the manufacturer's price. The cuts run up as high as 10% on some deals. Because of the situation, one major supply company last week ordered its supply houses to cut their commissions by 5% on well-head equipment and 10% on floating equipment. This was a general cut to the entire trade. It was done to meet competition on a general basis and to avoid the

Tax Outlook in Texas: Darker

THE TEXAS petroleum industry has a real battle ahead if it hopes to head off new and heavier taxes this year.

This was made painfully clear by Gov. Price Daniel in his "state of the state" message to the legislature.

Daniel laid out a proposed tax program calling for:

...3% hike in gas tax from the present 7% of value at the wellhead to a new high of 10%.

This would cost gas producers another $22,500,000 a year. Daniel aims at making this more palatable to producers by making the increase temporary, to last for 1 year. He proposed also that operators subject both to the production tax and to the severance-beneficiary gas tax be given credit for payments of the latter on the production-tax increase.

...Revision of tax on corporation franchises to bring in more revenue from interstate corporations. He cited an interstate gas pipeline company as having $7,000,000 worth of property in Texas but paying no franchise tax because it makes no sales in the state. New tax formula would include a property factor.

...Higher gasoline tax. Daniel proposes that the state hike its gasoline sales tax by 1 cent a gallon with the move timed to coincide with the scheduled June 30 expiration of the 1-cent federal levy.

The Texas governor proposed these three tax changes as a means of retiring a current state budget deficit.

That, however, is not all.

To finance needed new spending, Daniel proposes other new taxes which, though general in scope, would hit the industry.

The major proposal is for a state-wide "payroll-earnings" tax at a rate of 1%—half to be paid by the employer, half by the employe. The expected yearly take would be about $107,000,000.

pitfalls of negotiated cuts for individual buyers.

An executive of the firm admitted the cut came right out of profits because the manufacturer didn't join in cutting.

Bargains in California . . . Majors on the West Coast, like their colleagues in other sections, have worked down inventories. And this year they will buy in anticipation of actual immediate needs.

One of the top majors on the West Coast is now operating from only a 2-month inventory, and a second has less than 90 days' supplies. Another is eliminating inventories and relying on jobber and mill stocks. It expects to save 5% by using the jobbers.

Two large California buyers mentioned that they were not buying out of stock from West Coast suppliers, but had started buying directly from mills in the Rockies and Texas because these concerns will deliver within 4 or 5 days at a more competitive price.

The buyers claim considerable savings stem from the new practice.

Foreign steel, meanwhile, is proving attractive in price to at least one big operator on the West Coast who admitted buying some foreign tubular goods. Another is buying foreign goods only when he can get bargain prices. Then he buys in quantity and warehouses the goods.

A third West Coast operator, however, is turning down the foreign material as "too risky."

The Mid-Continent . . . Nearly all operators contacted in Tulsa said flatly they will be buying more this year, and many supply houses reported they could see a mild pickup in January business.

One major, which operates throughout the Mid-Continent and Rockies, said 85% of the material used in 1961 operations will have to be purchased this year because inventories have been pared to the bone. Another reports that its buying this year will be 20% or more above last year because of some projects carried over from 1960.

A third major even said it would buy to build back its inventories to a reasonable level.

The consensus is that more pipe will be bought this year but sales of other items probably will be steady. Prices also should be steady, although there has been some price cutting recently in valves, fittings, and flanges. The market for pumping units has firmed up in the Mid-Continent after hitting some ridiculous lows.

What they're saying . . . Typical comments from the suppliers around the country.

"We detect some activity in casing, tubing, and drill-pipe business. But we have an overstock in general supplies. The valve market is lousy and prices are down."—Major supplier.

"Business is better now in our tubular goods lines than a year ago. Prices are steady—in fact pumping units have had some upward price adjustments that were needed."—Supply division of major steel manufacturer.

"January's first few days this year look better than last, but it's too early to tell what it will mean the first quarter." — Independent supply firm.

And on the off side:

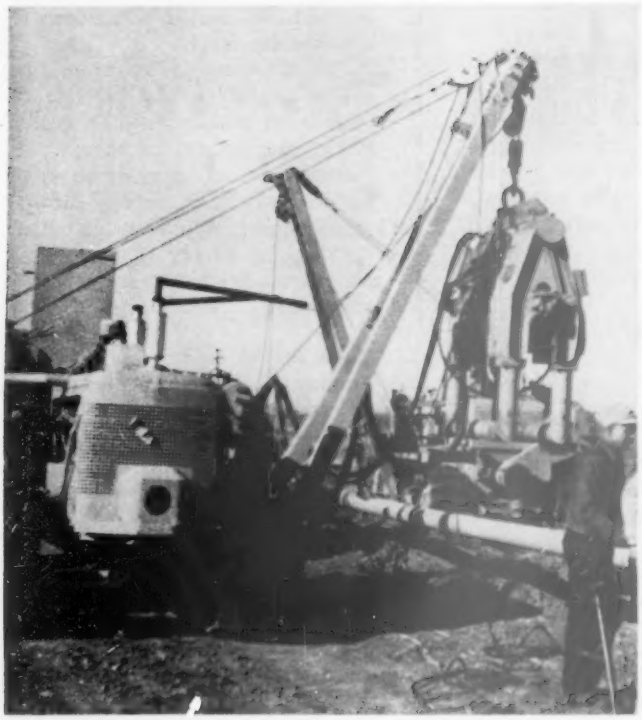
"There not only has been no pickup in sales, they are off. Price cutting is prevalent.

"The valve market is soft, and there isn't any price standard on pumping units. We're all hoping for a good year but present facts don't justify predicting one." — Medium-sized supply house.

"Sales are off but we sense a little more rig activity coming up. Prices are stable in our business and we look for a little better year than last year." — Drilling-specialty supply firm.

"There hasn't been any pickup at all in buying—it's down. I don't think companies are going to stock up again and build their own inventories. It looks like the suppliers will do the warehousing."—Production-specialty supply firm.

One supplier summed up like this: "Talk to 10 different oil men and you get 10 different predictions. But I think it's generally agreed that if the industry does much work this year it will have to buy supplies because companies have lived up their inventories."



NEW WELDING UNIT suspended above pipe. Built-in jaws to grip under side of pipe can be seen.

UNIT IS LOWERED onto pipe by tractor boom. Welding is don by rotated head operated by push button.

Automatic Welding Hits the Pipeline

Paul Reed
Pipeline Editor

AN AUTOMATIC pipeline welding machine is out to compete with manual welding on the right of way.

Field tests on a Humble Pipe Line Co. project near Odessa, Tex., have shown that line pipe can be welded in the field—in a fixed position and without rotating the pipe.

It is done by a machine using an entirely new concept for applying the CO_2 shielded arc process. Controls are preset and operated by pushbutton.

This, in brief, is what it can do:

. . . Complete the welding of an 8-in. diameter pipe in one minute;

. . . Make a weld as strong as one that is done manually;

. . . Function with only a three-man crew—operator, helper and tractor operator, and

. . . Operate in wind and rain that would stop a manual operation.

The machine . . . The first unit, used in actual construction in the Humble field test, welded 6-in., 0.219-in. wall, X-46 pipe. This unit is capable of handling 4, 6 and 8-in. pipe. The process can be adapted to weld pipe of greater wall thickness and larger than 30-in.

The machine was developed through Esso Research & Engineering Co.'s pipeline research program.

Cooperating in the research on the new process were Battelle Memorial Institute and Air Reduction Sales Co., which designed and built the prototype automatic welder. Crutcher - Rolfs - Cummings, Inc., Houston, also participated in development of the automatic welder and assisted in adapting it to field use.

Several years of research and 6 months of development work went into the first unit according to M. J. Dabney, manager of pipeline research for Esso Research & Engineering. Dabney has been in charge of the project since its inception.

The method . . . The procedure is a radical departure from the method now used for pipeline welding.

Pipe is furnished to the job with square butt ends. The two pipe ends are lined up by the machine and butted together with no spacing. The line-up is done by an external grip and internal clamps which hold the ends firmly in position.

The machine is placed over the joint to be welded by a side-boom tractor. Exact spacing is then obtained by cutting a slit of predetermined width at the juncture of the joints. The precise spacing that is required is made by an abrasive cutting disk as it cuts around the pipe.

The resultant spacing between the joints is narrow enough to eliminate the need for a backup ring. It is also wide enough for the welding that is done with a very short, hot arc. The accurate cutting of the spacing between the joints assures accurate travel of the electrode.

Cutting precedes the welding in a preset sequence on the same ring. The disk precedes the electrode by 180° and, after that amount of cutting, a limit switch begins the welding operation.

Amperage and voltage, as well as the welding speed, are preset. The welding unit is centered at the joint by cross hairs of gunsight type. From then on the operation is push-button controlled.

REPAIRS are made with pistol-grip CO_2 shielded-arc gun.

Right of Way

The operator neither guides the electrode nor regulates the welding conditions. He can observe the welding only from a single position. Actually, the sound of the operation tells him more than the appearance of the metal.

The welding is done with 280 amp., furnished by a more or less conventional generator, and approximately 27 volts. Reverse polarity is used.

A stream of CO_2 gas shields the arc-welding process. The process produces coalescence by heating with an electric arc between a bare wire electrode and the pipe metal. The welds have a good fusion at the root and the top and there is a good, well-fused nugget in the center of the pipe wall.

One bead is run in an arc from the top to the bottom on one side of the pipe. Then a bead is run on the opposite side and overlaps the other both at the top and at the bottom. Heat-affected zone on either side of the narrow weld is only ½ to ¾ in.

Welding speeds of 50 to 60 in. per minute are attained, depending on the wall thickness of the pipe. Handling larger and thicker wall pipe may require the use of additional welding-head equipment.

Normally, a consistent weld is obtained and there is no need for patching. Because of the nature of the CO_2 process, there are no gas pockets and no slag and only a minute amount of porosity. When patching is needed, the CO_2 welding is applied with a midget Aircomatic gun with a pistol grip. The wire electrode and gas flow through the gun.

This is the first use of the CO_2 shielded arc process in this manner for pipeline welding. It has been in use for flat work in welding shops for the past 5 years and has grown more rapidly than any other process.

Its application to pipeline welding is another step in the steady progress of mechanization of pipeline construction. This progress has seen hand ditching, pipe handling, coating and back-filling yield to machine operation. Possibly the greatest value of the new device will come when pipeline contractors have learned how to integrate it into their spreads, and, thereby, achieve speedier construction.

Sunray Has New Way to Save

• Handling its own stockholder records will cut costs $50,000 a year, besides several byproduct benefits.

SUNRAY Mid-Continent Oil Co. has started servicing its own stockholder records in a project calculated to save $50,000 a year and achieve more efficient handling.

Lewis Lacy, Sunray's corporate secretary, conducted an extensive survey of automatic equipment and records systems before embarking on the new project. As a result, Sunray invested $75,000 in new equipment and supplies and moved the records of its 130,000 stockholders from three New York banks to Tulsa headquarters.

Lacy gives this summary of the economies expected: Cost has been running $77,300 annually for servicing Sunray common and two separate preferred issues in New York. Cost of doing the job in Tulsa is estimated at $26,000. This covers all supplies, wages of a newly trained supervisor and three women clerks. Thus, payout is less than 2 years.

What equipment is involved? . . . Sunray is using the Addressograph system, a variety of machines designed for automatic data processing from embossed name plates which also carry key-punched sensory tape.

The machines do a host of jobs. They keep stockholder lists up-to-date, keep accounting records of each stockholder's interest, write and sign dividend checks, prepare U. S. and state income tax returns on dividends paid, handle proxy statements, and stuff, seal, and stamp mailings.

In addition, the machines perform many auditing and control functions. They can, for example, tell quickly who has cashed dividend checks, show how many proxies have been returned, give subtotals in various categories of stockholder lists.

Better relations . . . Lacy said that, besides savings achieved, the big advantages of a company handling its own stockholder records are speedier service and closer contact with the stockholder.

Sunray now can answer a stockholder's question about his stock in a matter of days. A change of address can be made for a stockholder in 24 hours—formerly it took 10 days to 2 weeks. New stockholders can be welcomed more quickly and communication with old stockholders is cheaper and easier.

Lacy says use of the equipment may be expanded to other departments of the company. Possibilities are cultivation of stockholders as customers of Sunray products.

Lacy reported that he has received inquiries from other corporate secretaries asking about the Sunray project. He predicted other firms soon will start handling their own stockholder records. The Sunray survey, he said, indicated a company should have at least 25,000 stockholders to make the step.

Alberta LPG-Export Plan Gets Boost

- Standard of Indiana gives new impetus to a proposal for moving surplus by-products from Canada to the U. S. The company will help Pembina Pipe Line construct a gathering system in Alberta and build a trunk line to Chicago.

A BIG BOOST for a proposal to export surplus butane, propane, and condensate from Alberta to Chicago has been provided by Standard Oil Co. (Ind.).

Standard disclosed last week that it is joining Pembina Pipe Line, Ltd., Calgary, in the design, financing, construction, and operation of a gathering system in Alberta and a trunk line to Chicago. Although the companies have cited no figures, it has been estimated that the project will cost up to $150 million.

It will provide an outlet for surplus by-product liquids obtained in processing natural gas. Most of the gas will be exported through the Alberta-San Francisco line now under construction. Gas exports are to begin late this year and will reach 650,000,000 cu. ft. daily under present authorizations.

Standard of Indiana is offering to supply what has been the missing link in the project for export of liquids—a guaranteed market.

But the proposal still has several formidable obstacles to overcome. It must be favored over several competing applications before the Alberta Oil and Gas Conservation Board (OGJ, July 18, 1960, p. 57).

It must also obtain federal Canadian approval. And it must risk the return of import controls on Canadian oil.

Standard-Pembina proposal . . . The original plan was for an 885-mile 4 to 16-in. gathering system in Alberta and a 1,300-mile 16-in. trunk line to Chicago.

The gathering system, under the plan first filed with the Alberta Conservation Board, would be built by Westalta Products Pipe Line, Ltd., and the trunk line by Foothills Pipe Lines, Ltd. Both are backed by Pembina.

Capacity is estimated at 73,800 bbl. daily, starting in 1962. This would rise to 190,000 bbl. daily by 1976. Deliveries would be made to Calgary and Edmonton refining areas as well as to Chicago area.

The stream has been estimated variously at 85% condensates and 15% butane and propane to 77.3% condensates, 15.3% butane, and 7.4% propane.

The project is conceived as a centralized gathering and transport system for virtually all new production of natural-gas liquids in the province.

This contrasts with competing proposals by operating companies who would dispose of their own production and promoters who would build gathering systems and use existing crude-export lines to transport any surplus. And the size of this surplus remains in dispute.

In the announcement by John E. Swearingen, president of Standard of Indiana, and James A. Scott, president of Pembina, no revisions of the original Pembina filing were mentioned. But Standard of Indiana is understood to favor a different route for the section of the trunk line in the U. S.

The companies did stress two points:

. . . Needs of Alberta and western Canada would be served first, thus meeting criticism that the proposed export would create a shortage locally—particularly of butane and propane.

. . . The nearest market capable of handling the excess natural-gas liquids over provincial requirements is Chicago, with its 600,000-bbl. daily refining capacity.

Market development . . . The most significant contribution to the project by Standard of Indiana is the means of developing an orderly market for the Alberta surplus.

Swearingen said Tuloma Gas Products Co., Standard's wholly owned LPG subsidiary, is offering to purchase natural-gas liquids from Alberta producers on a 20-year basis. The purchase offer would tie in with the sales of natural gas from which the liquids are derived.

Tuloma also is working on plans for interim purchase of Alberta liquids prior to completion of the 1,400 mile 36-in. pipeline which will take the gas to California.

Standard, with a 215,800-bbl. daily refinery at Whiting, Ind., is the biggest single prospective buyer of Alberta condensate and butane.

Other Chicago area refiners and their daily capacities are Cities Service Oil Co., 58,000 bbl.; Berry Refining Co., 13,300; Mobil Oil Co., 36,000; Sinclair Refining Co., 111,000; Clark Oil & Refining Corp., 35,000; Pure Oil Co., 47,500; and Texaco Inc., 67,000.

Standard of Indiana and some of the other refiners will soon have Alberta liquids to dispose of. And test samples indicate the condensates will make excellent reforming stock for high-octane gasoline production with minimum fuel oil, thus balancing yields more closely with the Chicago market.

Competing projects . . . Several companies have advanced proposals for pipelines to handle all or part of the new Alberta liquids produc-

INDUSTRY

A gas-storage area will be made out of the Howell field in Livingston County, Michigan, by Panhandle Eastern Pipe Line Co. if FPC approves the conversion plan. For full-scale operation of the $4,716,000 project, Panhandle would use 20 billion cubic feet of gas—3.5 billion as working gas and 16.5 billion as cushion gas.

The first IBM 7090 computer placed in industrial service in the Southwest has been installed at Texaco's Houston office. It replaces an IBM 705 which had been used for more than 3 years. Mobil, the first company in the industry

tion, and are awaiting a decision by the Alberta Conservation Board.

Hydrocarbons Pipeline, Ltd., Calgary, proposes a 503-mile 4 to 12-in. gathering system costing $13 million, with throughput estimated at 54,300 bbl. daily in 1962. Deliveries would be made to Calgary, Innisfail, Hughenden, and Interprovincial Pipe Line Co.

Provincial Products Pipe Lines, Ltd., proposes a 700-mile 3 to 16-in. gathering system costing $25 million. Deliveries would be made to Edmonton for export through Interprovincial and Trans Mountain Oil Pipeline Co., to the Great Lakes area of the U. S. and Canada and to British Columbia and Washington.

Britamoil Pipe Line Co., Ltd., subsidiary of British American Oil Co., Ltd., proposes two pipelines: A 120-mile 6-in. line from its Pincher Creek plant to Calgary and a 60-mile 8-in. line from its Dick Lake plant to Edmonton.

Hudson's Bay Oil & Gas Co. Ltd., an affiliate of Continental Oil Co., and the latest entry in the race, proposes an 11-mile 4-in. line from Waterton-Castle River area to Pincher Creek, and 30 miles of 8-in. line from there to the international border at Carway. There the line would connect with Continental Pipe Line Co.'s U. S. system.

With maximum capacity of 32,600 bbl. daily, the Hudson's Bay line, through interconnecting U. S. pipelines, would put the Alberta product into such markets as Wood River, Ill., and Chicago.

Westalta is proposing to connect its own gathering system to Continental facilities at Carway.

Two other companies have proposed a method of reaching Chicago, both by extending Interprovincial's Lakehead crude line from Superior to Chicago.

Interprovincial itself expressed willingness to extend the line, if a demand for the liquids were shown, and so did Mid-America Pipeline Co., Tulsa, which last fall started up its new LPG line from Texas and New Mexico into St. Paul-Minneapolis and Madison, Wis.

Political factors . . . The Standard-Pembina proposal would be very popular with Canadian producers because it would open a new market for Canadian production.

It would be unpopular among U. S. producers. Many would regard it as contrary to the spirit of regulations giving Canadian oil preferential treatment in the U. S. They have previously expressed alarm at the prospects of such a market "raid" and can be expected to demand that the liquids be put under some form of imports control.

The U. S. Department of Interior in the Eisenhower administration was studying the impact of the proposed project.

Alberta officials have been keeping a wary eye on Washington, and apparently are being careful to make no decision on export projects until the Kennedy administration has settled into place.

Any imports restrictions growing out of the Alberta project might take one of two forms: Quotas for Canadian oil once more, or deduction of the new Canadian volume from present quotas applying to other foreign imports.

The latter method is considered more likely, if indeed any form of controls is adopted.

Louisiana Lease Sale Planned on Offshore Tracts

THE LOUISIANA State Mineral Board has set its first lease sale of the year for May 18 at Baton Rouge.

Island acreage and tracts in Zone 1 offshore will be offered to the industry.

Deadline for nominating tracts is March 31. The board's next meeting will be held Feb. 16 at Baton Rouge.

The board also announced last week that companies interested conducting exclusive geophysical operations or leasing acreage in the state-owned Rockefeller Wildlife Refuge and Game Preserve should notify the board by March 15.

The refuge is located principally in Cameron Parish and currently there is some production there.

BRIEFS . . .

to use the 7090, installed one in its New York headquarters last year.

A new research center will be constructed by Mobil Chemical Co. in Edison Township, New Jersey. The company has bought 14 acres of land next to the Socony Paint Products Co. Mobil Chemical also has a branch research and development laboratory in Beaumont, Tex.

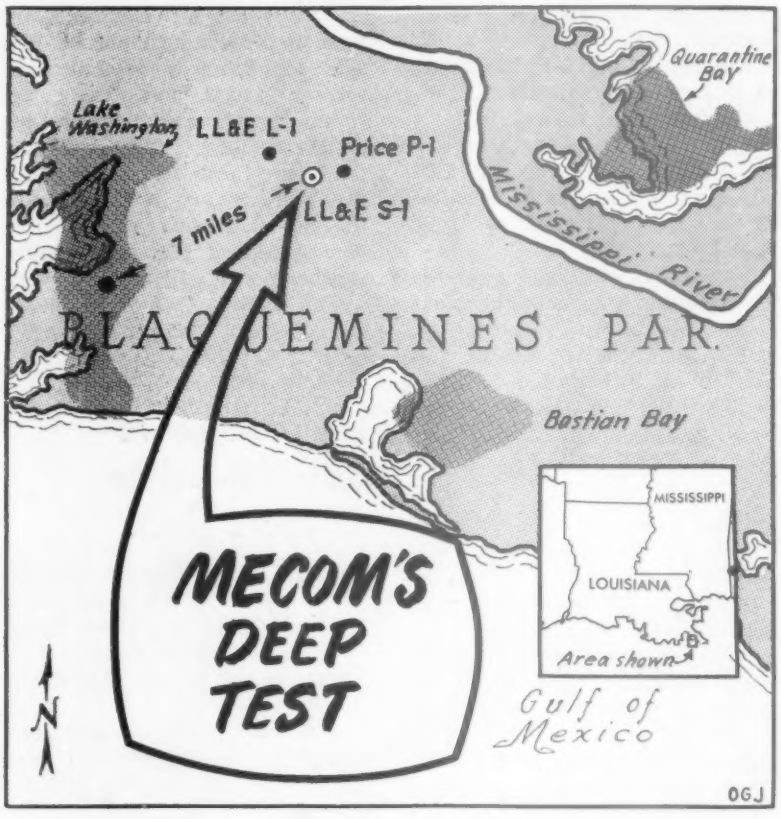
First Los Angeles outlet is in the works for Pauley Stations, Inc., new marketing arm of Edwin W. Pauley operations. The company, which entered retail marketing last fall, has 15 other stations.

Producing Properties, Inc., has acquired interests in 47 gas wells in California from Vistario Corp. for $1,650,000. The wells are in River Island, East River Island, and Isleton fields in Sacramento and San Joaquin counties. Producing Properties estimates gas reserves acquired at 14,720,000 M.c.f. The purchase is the seventh made by the firm in California in the past 16 months. In the previous six deals for producing properties, the company bought working interests in 304 wells under 86 leases in 16 fields.

Growth of LPG demand in the U. S. and Canada will be analyzed by Arthur D. Little, Inc., industrial research and management consulting firm. The study aims at pinpointing regions and end uses with the greatest growth potential, and examining the economics of expanding supply to satisfy this demand growth.

Union ratification of the wage agreement negotiated with Sinclair Oil Corp. has been completed by OCAW locals with 7,000 to 8,000 members. The union thus accepted the increase of 14 cents an hour. The agreement covers five of Sinclair's six refineries, and workers in producing, pipeline, and research divisions.

Marketing in Puerto Rico of "Chevron" and "RPM" products is planned by Standard of California. A subsidiary, Cia. Petrolera California, Inc., is building 10 stations on the island.



Mecom Well Pegged to "Ifs"

- **South Louisiana test is geared for record depth, but geological data will decide point where drillers quit.**

JOHN W. MECOM has engineered his $2 million test in South Louisiana to drill to 26,000 ft., the world's deepest hole, but geological data from the well—not the desire to set a record—will determine total depth.

A Mecom executive in Houston last week made it explicit that U. S. Oil of Louisiana, a Mecom corporation, is bent on making money, not rewriting the record books. The present depth record—25,340 ft.—was set in Pecos County, Texas, in 1958.

If the company finds what it wants at 20,000 ft. or a shallower depth, it will quit right there.

The difference between the new test and other ultradeep wells drilled in South Louisiana's swamplands is that the well is prepared, by advance planning, to go to 26,000 ft., and even beyond, if necessary (OGJ, Jan. 2, p. 47).

Last week the drillers were moving below 12,200 ft. and had experienced no major drilling problems.

The location . . . The well, designated the LL&E Unit S-1, is just 1½ miles southeast of the LL&E Unit L-1, which went to 22,570 ft. and once was the world's deepest. It is less than 1 mile west and slightly south of the world's deepest producing well, the Price Unit P-1, at 19,000-plus feet. All are Mecom wells.

The structure which is being drilled may be related to the highly productive Lake Washington salt dome. Lake Washington production, on the northern and southern flanks of the dome, comes as deep as 14,000 to 16,000 ft. and is 4 to 5 miles from the center of the dome.

The wells which have found commercial oil and oil shows in the deepest sands are generally off to the northeast of the dome some 6 or 7 miles from its center. And this is the area where the S-1 is drilling.

While Mecom hopes to find oil below 20,000 ft., if the well goes that deep, his geologists have few correlations to guide them and are not shooting for any particular depth. They expect to remain in the Miocene, the age of most South Louisiana production.

In this area the downdip Miocene is difficult to define and correlate because distinctive paleontological markers are lacking.

The deepest test in the L-1 was at 21,600 ft., which found an oil show and salt water. The first completion was at 21,443-65 ft., which produced until it had mechanical trouble. Then it produced for more than 2 years at 20,741-45 ft. before going to salt water. The well is not producing now but may be recompleted, and possibly drilled deeper, if the S-1 gives encouragement.

The payout . . . Even if Mecom succeeds in finding oil, what hope does the company have that it will ever get back its $2 million investment?

The answer to this question lies in two directions: First, the sands must be good and numerous; and second, it may be necessary to ask the Louisiana Conservation Department to give special consideration to the well's allowable as a means of encouraging more deep drilling.

Since the S-1 is costing some four or five times what it takes to drill a 15,000-ft. well, which gets a 159-

PROCESSING

Benzene capacity has been tripled to a total of more than 60 million gallons yearly in a newly finished conversion program at Shell refineries in Houston, Wilmington, Calif., and Wood River, Ill. The expansion makes Shell one of the world's top benzene producers. A large part of the benzene output will be used by Shell Chemical to make styrene for manufacturing synthetic rubber and polystyrene plastics and in phenol for oil additives, resins, and adhesives.

Antiknock gasoline additives will be produced by Stepan Chemical Co., Northfield, Ill., under a work-

bbl. daily allowable, it is patent that a much higher allowable—greater than the ordinary depth bracket allowable—will be necessary for a payout.

The Conservation Department recently approved a 50% increase for wells drilled on 80-acre spacing (instead of 40), and the S-1 would, of course, qualify for this. However, the state limits the allowables granted multiple completion wells to two for oil—and this would be a handicap if the S-1 finds the several pay sands it expects.

Tidewater Splits Marketing

DECENTRALIZATION of Tidewater Oil Co.'s 14-state Eastern Division marketing operations will go into effect this week under a major reorganization.

J. G. Jimenez, Tidewater's general manager in the East, announced the creation of three marketing districts. They are New England, covering the New England states; New York, covering New York and northern New Jersey; and Middle Atlantic, covering South New Jersey, Pennsylvania, Delaware, Maryland, Virginia, and North Carolina.

District marketing managers will be Thomas A. Differ, New England, in Brookline, Mass.; Joseph M. Jerome, New York, in New York City; and E. L. Beamon, Middle Atlantic, in Philadelphia.

Capa Madison Flood Slated

- **Engineers figure North Dakota water-injection project will recover more than 9,000,000 bbl. of oil.**

RECOVERY of 9,374,000 additional barrels of 40°-gravity oil is expected from a water flood-pressure maintenance program that will start this year in the Madison formation of Capa Madison pool, Williams County, North Dakota.

Amerada Petroleum Corp. is the operator. It owns most of Capa Madison.

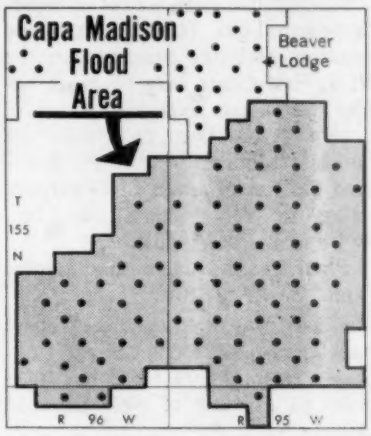
The pool, discovered in December 1953, has 83 wells which have produced 5,175,000 bbl.

Primary methods would recover about one-third of the oil in place, compared with an estimated 60% by flooding. Engineers figure that in 5 years production will total 2,780,000 bbl. above primary.

Unitization was authorized December 28 by the North Dakota Industrial Commission. An operator agreement has been signed and 47% of the royalty owners have approved the unitization. The number of injection wells hasn't been determined.

Other interest holders, besides Amerada, include Hunt Oil Co., five Hunt trusts, Skelly Oil Co., and Margaret Trusts of Phillips Petroleum Co.

The Capa Madison unit covers 8,271 acres, of which 6,985 are productive. Average gross thickness of pay sand at 8,300 ft. is 49 ft. Bottom-hole pressure has declined from 3,858 psi. in 1953 to 2,604.



Amerada's Capa Madison water-injection project is the third of its kind in the Williston basin area operated by the company. For the past 26 months the Beaver Lodge and Tioga pools have been under flood. Ultimate recovery from these two pools is expected to reach 258,000,000 bbl. or 72% of the oil in place.

There are 264 wells in Tioga and 193 in Beaver Lodge. The latter was found in 1951, Tioga in 1952.

BRIEFS . . .

ing agreement with Societa Lavorazioni Organiche Inorganiche (SLOI), an Italian company which will furnish plant-design information and technical data. SLOI manufactures tetraethyl lead and tetramethyl lead additives at a plant in Trento, Italy. It will have an equity in the new operation.

Gulf's refinery-technology laboratory is being shifted from Girard Point near Philadelphia to Gulf's main technical center near Pittsburgh. The move is the last step in consolidating the company's research and technical services under independent management.

A $6-million gas-processing plant will be constructed by Western Leaseholds, a subsidiary of Canadian Petrofina Ltd., in the Wildcat Hills district near Calgary, Alta. Initially, the plant will be able to process 40 million cubic feet of raw gas daily, yielding about 35 million cubic feet of pipeline gas along with 450 bbl. of stabilized condensate and 50 tons of sulfur. November is the target date for the start of operations.

Vinyl chloride monomer capacity at Monsanto Chemical's Texas City plant is being boosted by 50% to 150,000,000 lb. yearly.

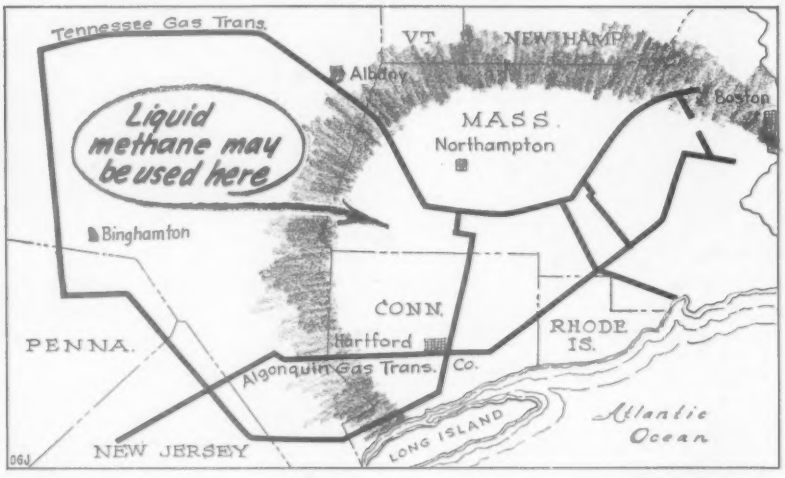
Also for Refiners . . .

IN THE NEWS: Indiana Standard joins in project to bring Alberta natural-gas liquids into the Chicago area (p. 86) . . . Eastern utility group is studying possibility of building liquefied-methane plant for peak-load shaving (p. 90) . . . Texas allowable set at 8 days in February (p. 92) . . . Texas refiners step up runs as cold weather hits (p. 93) . . . ENI building refinery in Ghana promising eventually to give 50% interest to government (p. 102).

PLUS REVIEW-FORECAST SECTION on supply and demand (p. 134).

Liquid Methane May Warm East Coast on

Gene T. Kinney
East Coast Editor



ANNOUNCEMENT of a liquefied-natural-gas (LNG) plant for meeting peak-day demands on the U. S. East Coast may be made before the year is over.

Interest has been high since the tanker "Methane Pioneer" delivered the last of seven LNG cargoes on its run from Lake Charles, La., to London last August.

Planning is active on several fronts:

. . . A consulting-engineer report backing up the technical and economic feasibility of LNG has been given to a group of New England utilities.

. . . Several East Coast utilities and the transmission companies which supply them are studying LNG as a possibility for their own peak-shaving needs.

. . . Research into the best means of storing LNG is being pushed by the American Gas Association, which may decide to build a test tank this year.

A gas-industry spokesman who is following all of these developments said last week:

"I will be surprised if someone doesn't announce plans for a natural-gas liquefaction plant this year."

New England problem . . . The leading candidate to build such a plant is an organization of 40 utilities called the New England Gas Pooling Group. The members operate in Massachusetts, Rhode Island, New Hampshire, and Connecticut.

These states are more than 2,000 miles from the Southwest producing area, making the utilities more distant from their source of supply than any other companies in a major U. S. gas market.

There are no depleted gas fields to provide underground storage in any of the states. And it's a long way to the storage fields of their suppliers, Tennessee Gas Transmission Co. and Algonquin Gas Transmission Co., which is in turn supplied by Texas Eastern Transmission Corp.

The average New England distribution company's load factor within 3 or 4 years will be less than 50%. This is so mainly because the commodity-price component of pipeline rates is greater than the cost of competitive fuels in much of the interruptible market.

The average cost of gas to distributors at 50% load factor is about 75 cents per M.c.f., according to R. J. Rutherford, president of Worcester Gas Light Co., Worcester, Mass., and chairman of the pooling group's executive committee.

For winter-peaking service, distributors must rely on propane-air mixtures and various types of manufactured gas to meet extra space-heating needs on the coldest days.

The vulnerability of their situation was pointed up some 3 years ago when the main line of one of the suppliers broke.

All 40 New England customers of Tennessee and Algonquin have joined forces to study what could be done to keep gas on their systems in the event of further transmission-line failures. They have also decided that their peak-shaving problem lends itself to a pool solution.

The four states are heavily populated—9,000,000. Ohio has roughly the same population but the New Englanders are packed into an area only one-third as large as the Buckeye state.

Pool plans . . . A study by Stone & Webster Service Corp., retained by the pooling group, indicates that a central peak-shaving LNG plant is the best solution from an operational standpoint.

Natural gas will be much simpler to handle than produced gas that is not compatible with the existing stream.

Having been advised that LNG is feasible, the pool is concentrating on the second half of the question: Can pool members and the pipeline companies on whose systems LNG facilities would be installed work out a satisfactory rate schedule between storage and delivery points on individual systems?

If they can, the New England group is expected to proceed with plans to build the plant.

Stone & Webster estimates a plant with 3 billion cubic feet of storage, costing $22 million, would be adequate for peak shaving during the 35 to 40 days per year it would be needed.

The sendout for the 40 companies in 1964 is projected at 158 billion cubic feet, about one-third greater than current volume.

The plant would handle "valley" gas purchased by the distribution companies in summer for liquefaction and storage until winter. The rate for excess commodity gas from Tennessee is about 33 cents per M.c.f.

Liquefaction and storage of domestic pipeline gas, according to Stone & Webster studies, would be about 15 cents per M.c.f. cheaper than the optimum cost of peak shav-

Coldest Days

ing with Venezuelan gas liquefied and shipped to New England by tanker. The margin is roughly equal to the value assigned to the gas in Venezuela.

Other LNG candidates . . . Most of the transmission companies with lines from the Southwest to the Northeast have been looking at LNG from time to time, and so have their utility customers.

Transcontinental Gas Pipe Line Corp. has also retained Stone & Webster for a study in connection with its operations in the New York area.

Texas Eastern and Tennessee are, of course, interested in what their New York and New England customers are considering—and in the possible use of LNG themselves for providing peaking service.

Brooklyn Union Gas Co. is "actively looking at liquefied natural gas," a spokesman reports. "But New England is ahead of all of us on this," he adds.

The transmission companies are investigating LNG as a supplement to underground storage for peak shaving, and not in connection with regular winter service. It could take the place of individual peak-shaving plants of utility customers.

LNG storage capacity, under this concept, would constitute no more than a 5-day supply of gas. During some winters it might not be used on more than 2 or 3 days. It would be placed as near the end of the line as possible to minimize investment in facilities between storage and customer.

LNG would supplement individual peak-shaving plants supplying manufactured gas and propane-air at the utilities' point of use.

AGA progress . . . The AGA, after investigating various methods of point-of-use storage, has concluded that storage of natural gas in liquid form is the most attractive.

The big advantage is its 100% interchangeability with pipeline gas.

Accordingly, the AGA is pressing forward on a research program to determine the best means of storing LNG.

watching WASHINGTON

Clyde La Motte

- **Court ruling adds to string of breaks for coal . . .**

NOTE how the breaks seem to keep going coal's way.

Its effort to get Congress to make a fuels study is apparently bearing fruit. And coal has a commitment from the White House for a study, too.

It has the recommendations of James M. Landis, Kennedy's top adviser in this area, which give further support to some type of over-all energy planning.

One of coal's biggest breaks was last week's decision by the Supreme Court in the Transco-Con Ed case which clearly opens the door for more end-use supervision of natural gas by the Federal Power Commission (see page 96).

Coal will make much of the court's reference to the "wasting" of the nation's "limited" natural-gas supply when there is an abundance of another fuel available—meaning coal, of course.

Remember, too, that coal has been a vigorous intervenor at the Interior Department on the residual-fuel import-control program.

Add these up. It makes a pretty impressive score for coal. Questions for oil men to ponder: Has coal been lucky? Or has coal gained some of the breaks through an aggressive, well-organized program?

Critics sometimes say the oil industry, when it makes an appearance in Washington, generally is opposing, not proposing. Judging from the results the coal industry has been getting in government circles, maybe oil needs to review its tactics.

- **Oil group nears showdown on gas-legislation plans . . .**

ONE MAJOR area in which the oil industry is trying to launch an aggressive move on its own is in gas legislation.

An intra-industry group of top leaders met in New York Monday. It hopes to reach some agreement on proposals for a specific gas bill. If so, it will call for an all-out drive to sell its proposals to Congress and the public.

The timing for such a move is not good. Opponents will urge delay, pointing to the FPC's current attempt to put area pricing into effect, and to the fact that a fuels study or two is pending.

However, there is not much choice. Either the industry tries to get something done or it lets the reins pass to some group outside the industry.

- **"Free" Mexican oil imports may be challenged . . .**

PRODUCER GROUPS are eying askance the importation of Mexican asphaltic crudes into Texas free of oil import controls.

Technically, there is no violation of the control program, Interior officials say. The crude is shipped into Brownsville under bond, transported across the border into Mexico and then hauled by truck back into Texas. Thus, it is an "overland" import and exempt from import controls (OGJ, Jan. 16, p. 47).

Some U. S. producers consider this a hanky-panky evasion of the rules and feel the Government is off base in permitting—if not actually condoning—it.

The amount is not much, reportedly about 10,000 bbl. daily. But, say upset Texas producers, if the import rules can be bent in this fashion in one place, it can happen elsewhere for there is no definite stopping point.

Texas Sets Flow at 8 Days

- **Decision means the commission is not ready to fight for lost crude markets by increasing state output.**

BY SETTING the February oil allowable at 8 days, the Texas Railroad Commission has revealed that it is not yet ready to open up the state's wells in a battle to regain lost crude markets.

In December E. O. Thompson, then chairman of the commission, warned that Texas was tired of doing the nation's job of holding down production while oil from other states flowed into Texas refineries.

And last week William J. Murray, Jr., new chairman, echoed the warning.

The third member of the commission, Olin Culberson, has voiced his irritation over this situation frequently in the past year.

Yet, in fixing the February allowable, the commission choked back state oil output a bit more. And passed over what might be considered reasonable grounds for an increase.

Although eight of 13 major purchasers recommended the 8-day pattern, the state's biggest crude buyers were among the five who sought 9 days.

And of the eight in the first group, only three said they would have crude to sell if a 9-day schedule were adopted. The three would have had an estimated total of between 26,000 and 30,000 bbl. a day for sale.

On the other hand Mobil, Humble, Sun, Texaco, and Atlantic testified they would be short of their crude needs by a total of at least 80,000 bbl. daily on 8 days.

Humble testified it had been able to buy only 11,600 bbl. daily on 9 days in January despite a need for much more. Humble's Charles Shaver said the company would need to buy 40,000 bbl. daily on 8 days in February. He doubted it would be available.

D. R. Wall of Mobil Oil Co. said his company would need to buy 30,000 bbl. daily of spot crude in February on 8 days. Mobil needed to buy 20,000 bbl. daily in January but could dig up only 8,000 bbl. daily, he said.

TEXAS ALLOWABLE BY DISTRICTS

District	February	Ch. from Jan. 7
1. Southwest	51,838	+ 181
2. Gulf Coast	112,776	− 672
3. Gulf Coast	357,122	− 1,935
4. Southwest	188,212	− 1,522
5. East Central	30,459	− 146
6. Outside East Texas field	123,012	− 414
6. East Texas field	133,156	− 1,522
7-B North Central	159,940	− 511
7-C West Central	131,857	− 1,428
8. West Texas	1,132,069	− 7,879
9. North Texas	251,215	+ 287
10. Panhandle	132,821	+ 1,307
Total	2,804,477	−14,254

Facing dilemma . . . The commission is riding the horns of a dilemma which is growing more painful.

If it continues to hold down allowables, the slow but steady loss of Texas oil markets to other states is likely to continue.

But if it abandons its unwanted role as prime buffer state in the national crude-production picture and opens up wells, presently comfortable U. S. stocks of crude and products would shoot up. Producers' hopes of restoring at least a part of crude price cuts made in the past 2 years would be dashed. And even deeper price cuts would not be out of the question.

The fact that the commission didn't boost the February allowable may indicate that it considers the latter alternative the more serious of the two.

Down 14,254 bbl. . . . On 8 days in February, the Texas allowable will be 2,804,477 bbl. daily.

This is a slight gain of 5,320 bbl. daily from the initial allowable for January, but a drop of 14,254 bbl. daily from the 2,818,731 bbl. daily in effect January 7.

Purchasers nominating on 8 days included: Indiana Oil Purchasing, Sinclair, Conoco, Shell, Cities Service, Phillips, Standard of Texas, and Gulf. Mobil, Sun, Atlantic, Texaco, and Humble favored a 9-day schedule.

Independent sentiment again was mainly on the conservative side. Spokesmen for the North Texas Oil and Gas Association, the West Central Texas Oil and Gas Association, and a Dallas group of 45 operators urged 8 days. Independents in the Corpus Christi area wanted 9.

Northern Natural Buys Monterey's Transwestern Stock

ANOTHER major natural-gas company is joining those supplying natural gas to California.

Northern Natural Gas Co., Omaha., has announced that it will buy stock in Transwestern Pipeline Co., which completed a new line to California last year.

Northern plans to take about 16% of the Transwestern common stock now held by Monterey Oil Co. The agreement was announced by John Merriam, Northern's board chairman, and Howard Pyle, Monterey president.

Monterey is being liquidated. It recently sold most of its assets to Humble Oil for $118,300,000. This amount will be boosted by the $11,875,000 Northern pays for 950,000 shares at $12.50 each.

Northern's principal operations have been confined to the Central U. S. It takes gas from Kansas, Oklahoma and Texas and distributes it in Minnesota, Iowa, South Dakota and Nebraska. Its main line, a multi-looped system between Texas and the Twin Cities, crosses Transwestern's line in the Texas Panhandle.

Some of Northern's production comes from its own wells in the states where it gathers gas. It also has producing operations in New Mexico, Colorado and Montana and in Alberta, Canada.

Recently the company absorbed its subsidiary, Permian Basin Pipeline Co., which operates in West Texas and New Mexico.

Cold Weather Pushes Up Texas Crude Runs

- Refiners report that average daily rate in December topped 6,000,000 bbl., a slight increase.

REFINERS of Texas crude inched up runs last month as their inventories of crude and products shrank because of colder weather.

Reports filed with the Texas Railroad Commission showed that refiners buying crude in Texas ran oil to stills in December at an average daily rate of 6,021,137 bbl.—up 116,250 bbl. daily from the November average of 5,904,887 (OGJ, Dec. 26, 1960, p. 83).

Meanwhile, total stocks of crude and products held by those companies slid back nearly 24,000,000 bbl., from 532,455,000 bbl. on December 1 to 508,562,000 bbl. as of January 1 this year.

A heavy run on distillates was responsible. Distillate stocks held by 36 reporting companies fell 28,705,000 bbl. in December to 114,301,000 bbl. on January 1.

Inventories of kerosine and residual also were down. Kerosine stocks were trimmed 3,541,000 bbl. to 24,958,000, while resid was down 2,672,000 bbl. to total 28,581,000 bbl. on January 1.

Gasoline chalked up a seasonal rise of 3,565,000 bbl. to 156,745,000 bbl. on January 1.

Inventories of crude, on the lean side recently, rose 6,460,000 bbl. during December.

Stocks on low side . . . At their present levels, total stocks of crude and products held by the reporting companies are nearly 13,000,000 bbl. too low, according to a commission roundup of individual company situations.

The composite shows only gasoline too high with a modest surplus of 1,157,700 bbl.

The companies' composite stock totals for crude, kerosine, distillate, and residual at year's end were below desired levels by 4,288,400 732,300, 5,279,900, and 3,779,300 bbl., respectively.

Runs fluctuate . . . Total runs of 13 of the largest refiners of Texas oil followed the upward trend, increasing 35,049 bbl. daily in December to average 5,054,876 bbl. daily.

Among the individual companies, however, nearly as many cut runs in December as increased them. Six made cuts and seven put through increases.

Sharpest changes were shown by Indiana Oil Purchasing Co., Sun Oil Co., and Texaco Inc.

Indiana hiked its daily average runs roughly 50,000 bbl., from 585,000 bbl. daily in November to 635,000 bbl. in December. Sun's jumped about 35,000 bbl. daily.

December's Runs

Company—	Avg. runs in bbl. daily
American Petrofina	17,477
Atlantic Refining	190,558
Bell Oil & Gas	6,447
Bryson Pipe Line	396
Century Refining	
Cities Service Oil	238,756
Continental Oil	185,398
Cosden Petroleum	36,519
Crown Central	33,408
Danaho Refining	3,955
El Paso Natural Gas	18,305
General American	
Gulf Oil	454,000
Humble	761,000
Indiana Oil Purchasing	635,000
LaGloria Oil & Gas	17,172
Monarch Refining	2,530
Ohio Oil	100,718
Permian	2,983
Phillips Petroleum	214,400
Plymouth Oil	27,105
Premier Oil Refining	14,319
Pure Oil	165,582
Shamrock Oil & Gas	24,331
Shell Oil	525,093
Signal Oil & Gas	50,701
Sinclair Crude Oil	425,296
Skelly Oil	51,965
Socony Mobil Oil	565,000
Sohio Petroleum	138,984
Standard of Texas	45,474
Sun Oil	220,017
Suntide Oil	40,987
Texaco	594,884
Tidewater Oil	208,613
Wickett Refining	1,955
Others	1,809

U. S. May Barter for Oil

MORE AND more of the Government's purchases abroad — perhaps including petroleum—may be paid for with surplus U. S. commodities rather than cash.

Advocates of the approach say it offers these benefits: It would slow the flow of gold from this country, it would help whittle stockpiles of our surplus commodities, and in some cases it would enable the Government to buy items it uses at lower cost.

At the moment, planning is being held up awaiting policy decisions by the new Kennedy administration.

Bartered oil . . . An official of the U. S. Commodity Credit Corporation said it appeared to him that application of the plan to at least some of the military's oil purchases abroad would be entirely feasible.

The plan has been discussed with the military and with several international oil companies, although indications are that this has been little more than a preliminary "feeler" to get views and suggestions from firms and military buyers.

If the Kennedy administration approves the general approach for all government buying abroad, however, the military is likely to explore further the possibilities of using the plan for oil procurement abroad.

How it works . . . This is the general way the commodity exchange plan works:

A government purchasing agency buys some equipment or product abroad. The seller agrees to assign the payment for the goods to the Commodity Credit Corporation.

In turn, the seller receives from the CCC payment in a surplus U. S. commodity.

Finally, the selling company turns the commodity over to a broker who sells it in countries designated in the original agreement.

In that fashion, the U. S. Government get the supplies it needs abroad while U. S. surplus commodities—rather than U. S. gold—goes abroad.

NEW METHOD puts dial in front, hose behind motorist for quick service. First commercial use will be in Italy.

DIALS can be preset for price, volume, and type of fuel.

BP Marketers Try Splitting the Pump Island

A COMPLETE break from the traditional gas pump will be tried out by British Petroleum at service stations in Italy and, later, in the United Kingdom.

Called Autovista, the new method separates two main sections of the pump—the dial and delivery hose. BP believes this may be the key to quicker service.

The motorist drives into the station facing the pump dial. The hose is at the rear of the car. The dials can be preset to deliver gasoline, diesel fuel, or a mix for two-cycle engines. Price or volume also can be preset on the dials, and the hose cuts off automatically when this price or volume has been reached.

BP believes the new system will give many advantages.

Greater flexibility in station design can be achieved because the dials and built-in computers are connected to the pump only by electric cables.

Big numbers on the dial give a clear view of the transaction to drivers. Automatic printed statements also can be given customers.

A single pumping unit can serve several sales points.

Wide range of products also can be dispensed through one pump, and the hose no longer must be dragged to the back of a car for each customer.

The system can be adapted to self-service coin operation.

Shell Has Show in Nevada

SHELL OIL CO.'s renewed drilling program in Nevada has resulted in the extension of one of three fault blocks in Eagle Springs field, the state's only commercial oil field.

Shell discovered the Nye County field in 1954, but has been unable to develop much production. Nine wells were drilled up until 1956. Three were completed as producers, but all from different fault blocks (OGJ, Apr. 2, 1956, p. 181).

The company's tenth well—62-35 Eagle Springs unit in 35-9n-57e—had a show in the Tertiary volcanics which produces in the discovery well. If production holds up, this well will give Shell its first two wells producing from the same fault block.

Shell has moved the rig 1,500 ft. north in an effort to determine the northern limits of the fault block. The new well, 81-35, is projected to 7,800 ft.

The 62-35 is 1,000 ft. east of the discovery. During a 2½-hour drill-stem test, the well flowed 73 bbl. of oil from 6,340-6,491 ft. The discovery well produces from 6,450-6,730 ft.

The company is planning to complete the 62-35 as an open hole. The well was drilled to a total depth of 7,755 ft., but plugged back to 6,500 ft. The operator set 5½-in. casing to 6,250 ft.

Eagle Springs' oil is about 26°-gravity. However, it is a highly viscous crude with a pour point of about 80°. The three completions are all pumpers and the oil must be heated before being moved to a Bakersfield, Calif., refinery in insulated trucks.

Past drilling . . . The 62-35 breaks about a 4-year drilling drouth for Shell in Nevada.

After completing the Eagle Springs discovery in 1954, Shell continued drilling for about 2 years, then curtailed drilling until the 62-35 was spudded last November.

New Gas Moves Made in Southern California

• Latest developments include a price cut for Rock Springs pipeline gas, hearings on TGT's plan for a Mexican line, and a new proposal to pipe Pemex gas into the coveted southern California market area.

THE SCRAMBLE to move more gas to southern California turned up three new developments last week.

Briefly, here's what happened:

. . . **The initial price** of gas moving into California through the proposed Rock Springs pipeline has been slashed 6.62 cents per M.c.f. in order to comply with the stiff conditions attached to the Public Utilities Commission's approval of the line.

. . . **Hearings were held** before the PUC on the pipeline proposed from Texas to California via Mexico. Tennessee Gas Transmission Co. is proposing this line to move Texas and Mexican gas to Southern California Edison in Los Angeles.

. . . **Plans were revealed** by a group of Beverly Hills and Tulsa business men for a second pipeline out of Mexico. The group has formed International Gas Co. and proposes a line based entirely on Mexican gas.

Southern California Co., and Southern Counties Gas Co., subsidiaries of Pacific Lighting Corp., moved swiftly in renegotiating gas-purchase contracts for the Rock Springs gas to comply with PUC demands. This action also involved some renegotiation with gas producers by El Paso Natural Gas Co. and Colorado Interstate Gas Co., the two out-of-state suppliers.

In a letter of compliance filed with the PUC, the two gas utilities said they will pay 33.38 cents per M.c.f. for their first two years' gas supply rather than the 40 cents originally proposed. The price would go to 40 cents January 1, 1964, and remain at that level for 20 years.

The companies propose to start taking deliveries in 1962. The gas would move through existing lines until January 1964, when the Rock Springs line would be complete.

The Rock Springs line would include 155 miles of 34-in. line Colorado Interstate would lay from Rock Springs, Wyo., to Provo, Utah, where it would connect with a 395-mile line El Paso would build to the California-Nevada border. The two gas companies would then lay a line to pick up the gas and move it into their southern California lines.

Ultimately the Rock Springs line would deliver 470,000,000 cu. ft. of gas daily to California. The newest proposal calls for deliveries to reach 68,500,000 cu. ft. in 1963, 262,000,000 in 1964, and 400,000,000 in 1965. An additional 70,000,000 cubic feet daily would be available by 1965.

Significance of Rock Springs . . . The gas companies obviously are trying to keep the price of gas at the California border as low as possible in an effort to block any newcomers — notably TGT — from moving into their market.

The revised price of 33.38 cents per M.c.f. is the same as the average price the two gas companies pay El Paso for the 1.13 billion cubic feet of gas the pipeline moves into the state each day. And the revision would keep this average at the same level until the 40-cent price goes into effect in 1962.

The 33.38-cent price compares to a price of 39 cents the two companies are paying Transwestern Pipeline Co. for the 350,000,000 cu. ft. of gas daily it moves into California. But even with the higher Transwestern price, the average paid by the gas companies is still only 35.4 cents per M.c.f.

Mexican line . . . California Gas Transmission Co., a TGT subsidiary, and Southern California Edison laid plans for the line from Texas and Mexico before the PUC in the 3-day hearings.

The plan includes laying 1,580 miles of line to deliver 340,000,000 cu. ft. of gas initially to Edison in Los Angeles. Eventually, the system would have a capacity of 750,000,000 cu. ft. daily.

Edison has been pushing the project because it wants its own source of gas. Currently, Edison is the biggest customer of both Southern California and Southern Counties and is supplied on an interruptible contract. The two gas utilities are vigorously opposing the line, claiming they can meet any demands made by Edison.

During the initial phase of operations, Humble Oil & Refining Co. would supply the line with 265,000,000 cu. ft. daily or 78% of the total. The remaining 75,000,000 cu. ft., or 22%, would come from fields in the Reynosa area of Mexico.

The PUC will hold several more hearings before reaching any decision on the TGT-Edison line. The commission's staff also must complete its investigation before making a recommendation.

The new Mexican line . . . International Gas is still negotiating for a gas supply in Mexico as well as customers in the Los Angeles area. The company hopes to flange up a supply from Petroleo Mexicanos and to move the gas through northern Mexico to the California border. The proposal calls for a line to handle 600,000,000 cu. ft. daily with 100,000,000 being delivered to towns in Mexico.

Potential customers in Los Angeles include the cities of Glendale, Pasadena, and Burbank, three of Los Angeles' suburbs, as well as the Los Angeles Power and Light Department. Edison also might buy some of the gas, and consumers in the Imperial Valley south of Los Angeles might take some too.

Officers and directors of the company include Thomas W. Evans, Clyde C. Dawson, and Dr. E. H. A. Andrews, all of Beverly Hills, and D. W. Cameron and Miles Carmichael, both of Tulsa.

Andrews is a geologist who formerly was a consultant to Pemex. Cameron heads a crude-oil buying and pipeline firm, and Dawson and Carmichael are independent operators. Evans is an investor who has been associated with the formation of other companies.

Court Ruling Tightens Gas Controls

• Decision termed threat to growth of gas industry. It hands FPC authority to consider the end use as well as price of industrial gas in approving sale even where pipeline serves only as a transporter.

A U. S. SUPREME Court ruling last week caused considerable consternation in the gas industry—and joy in the coal industry.

The court held that the Federal Power Commission has authority to consider end use as a factor, even when an interstate gas pipeline acts only as a transporter for an industrial user who has purchased the gas in the field.

In addition, the court affirmed that the FPC also has the right to consider the impact of the price of industrial gas (although it can't regulate that price) and to consider whether an industrial use preempts pipeline facilities that could be better used serving other types of consumers.

The case . . . The specific case involved the FPC's refusal of a certificate to Transcontinental Gas Pipe Line Corp. to transport gas which Consolidated Edison Co. had purchased in Texas for use under its boilers in New York City.

One point of the FPC denial was that this was an "inferior" use of a valuable natural resource.

To the FPC, this consideration overrode the argument by the company that the use was justified, particularly because by burning gas instead of coal it would help lessen New York City's smog problem.

An appeals court reversed the FPC, saying that the commission had overstepped the boundary of its authority.

But, last week, the Supreme Court ruled that the FPC was acting within its rights and exercising its duty to protect the greater public interest.

It said that unless the FPC were permitted to consider end use as a factor, an "attractive gap" would be left open for evasion of regulation.

It said a state conservation body certainly would not be able to control the use of gas in another state. Therefore, the court majority reasoned, the nation's natural-gas resources could be wasted unless the FPC could step into the breach.

The impact . . . Many in the industry fear that general application of the end-use ruling constitutes a serious threat.

Long lines, for example, consider industrial gas a vital backbone. Without it, they say, many pipeline projects would not be feasible because the use of other consumers would not support the lines. Industrial sales, they point out, help smooth out the sharp peaks and valleys that are common in most consumer uses, such as home heating.

There was speculation that the decision may adversely affect many planned pipeline projects, such as the proposed line through Mexico from Texas to California. This would be another instance of a pipeline serving merely as a transporter, and the eventual user would be a utility company.

Observers also wonder if the court ruling will not cause the FPC to be more aggressive in end-use regulation of sales to distributing companies, thereby possibly limiting or eliminating such sales. If so, they reason, the distributing firms would feel the brunt of the ruling.

One industry expert even warned that the ruling might back up adversely on producers, perhaps forcing them to charge more and more exploration, drilling and development costs to oil instead of gas, thereby pushing oil product prices up.

Coal's view . . . Without doubt, the court's ruling will encourage the coal industry to step up its campaign to limit further industrial use of gas and thereby increase the sale of coal.

A coal spokesman in Washington said, however, that "nothing was handed to us on a silver platter." The court did not put a stop to "dump" gas sales, he pointed out, "but merely gives us a weapon with which to fight them before the FPC."

Court opinion . . . The court emphasized that it was not prohibiting direct sales of gas from producer to a consumer nor that it was prohibiting sales to any particular group of consumers, such as utility companies which want the gas for boiler fuel.

Rather, the court insisted, it was merely upholding the FPC's rights to consider use, price, and other

Congress to Be Asked to Kill Court Ruling

CONGRESSIONAL action will be sought to offset the Supreme Court decision broadening the base for FPC regulation of gas.

This much was made clear last week in a letter to members of the Independent Petroleum Association of America by their executive vice president, Minor Jameson.

Jameson termed the action contrary to fuel policies established by Congress. He contended the court proclaimed a philosophy of hoarding natural-gas supplies, in contrast to this nation's historic policy of vigorous development and expanding use of natural resources.

The court also laid down a comprehensive system of rationing and price controls for one of the principal sources of energy vital to economic growth, he said.

factors in these sales when deciding "public convenience and necessity" in certificate cases.

The net effect, then, is that industrial sales, while not banned in any general sense, will undoubtedly come under closer FPC scrutiny in the future.

Clearly, the court's ruling establishes the commission more firmly in using gas conservation as a factor in granting or denying certificate applications.

Court reasoning . . . In its discussion of the case, the 6-3 court majority paid greatest attention to end use, price, and preemption of pipeline space.

Regarding end use, it said:

"No one disputes that natural gas is a wasting resource and that the necessity for conserving it is paramount. As we see it, the question in this case is whether the commission through its certification power, may prevent the waste of gas committed to its jurisdiction.

"One apparent method of preventing waste of gas is to limit the uses to which it may be put, uses for which another, more abundant fuel may serve equally well. . . ."

Regarding price, the majority said:

"As a matter of common sense, it would seem difficult to deny that the channeling of vast quantities of a wasting resource into unregulated transactions at a high price will result in scarcity to other consumers and a general price increase."

On air pollution, the court majority said:

". . . It was not shown that other methods—particularly the use of gas presently available to Con Ed under other forms of service—could not be used to solve the problem."

The three-man minority tended to agree with the majority on the end-use approach, but pointed out that this was only one factor to consider and said that the other factors had not been sufficiently supported to justify the FPC denial. It indicated it thought the majority had to stretch to make its ruling cover the FPC's action.

It proposed that the case be remanded to the commission for further hearing. Since it was in the minority, this will not be done.

Transco View: No Big Change

THE Supreme Court actually has made no sweeping changes in gas regulation, an attorney for Transcontinental Gas Pipe Line Corp. said in Houston.

He conceded some basic questions were involved in the Consolidated Edison - Transco case but added:

"The FPC has been giving consideration to end use of gas for years and the court's ruling does not represent any great departure from past actions in this respect."

The decision does appear to put an "effective block" in the path of consumers, such as a utility, who want to go to the gas supply area to buy nonregulated gas, but it "doesn't mean at all that the use of gas for electric generation will be stopped."

"In a majority of cases the FPC has authorized this," he said. "They were saying in this particular case it should be turned down because of policy considerations, not just the end use. There was the question of the effect on the price level generally which was in excess of the going price there at the time, but it was a flat rate (19¼ cents) and had no escalation clause."

Other Houston sources raised the question whether the court ruling would affect the proposed Texas-Mexico-California pipeline of Tennessee Gas Transmission Co.

Major difference in this project and the Con Ed-Transco case is that the Mexican pipeline plan calls for export of Texas gas to Mexico and reimporting at California. Some lawyers say it may be construed that this is not an operation in interstate commerce and thus not subject to certain types of federal regulation.

PIPELINE BRIEFS . . .

A $52-million pipeline system from Ciudad Pemex to Mexico City has been completed in Pemex's expansion program. The 530-mile, 24-in. gas line will supply cities in the states of Veracruz, Puebla, and Tlaxcala as well as sugar mills and other plants being built along its route. A 500-mile northward extension is planned to Queretaro, Salamanca, San Luis Potosi, and Guadalajara.

Addition of 3,400 hp. to its Eunice field compressor station in Lea County, New Mexico, will enable El Paso Natural Gas to take an additional 25,000,000 cu. ft. of residue gas daily from Phillips Petroleum. The gas is now being flared.

Sale of three Progas companies in Alberta to Canadian Hydrocarbons, Ltd., has been arranged subject to ratification of stockholders in Progas of Canada, Ltd. The companies—Progas, Ltd., Progas Pipelines, Ltd., and Stewart Petroleums, Ltd.—will be expanded by Canadian Hydrocarbons to handle more natural gas, propane, and butane.

Authority to spend $3,000,000 for additional gas is being sought by American Louisiana Pipe Line Co., which wants to tie in producers along its system.

Also for Pipeliners . . .

IN THE NEWS: Automatic pipeline welding machine ready for use on the right-of-way (p. 84) . . . Scramble to move more gas to California brings developments (p. 95) . . . Supreme Court decision shakes up the gas industry (p. 96).

PLUS THIS TECHNICAL REPORT: Major pipeline projects for 1961 (p. 144).

Saharan Oil Is Bringing Some Changes

• Demand within France will absorb most of the output, and the rest won't be an upsetting factor in world markets. Middle East producers will lose some sales in Europe, but their oil will still be needed in volume.

Paul Swain
International Editor

NOT LONG AGO, much of the oil industry awaited the influx of French Saharan crude with fears that it might be the straw which could break the back of an already overloaded camel.

Now it appears the new supply won't cripple the market, after all.

Reasons for the optimism include:

...Rising demand in France. This will soak up lots of the Saharan crude soon after it moves into the market.

...Downgrading of Saharan potential by the French They have taken second looks at what they have in the Sahara and at estimates of production from fields now being developed.

...A rebuff by France's European neighbors. These countries wouldn't agree with France that Algerian oil fitted into domestic production and therefore deserved a preferred position under the tariff-free provisions of the Common Market. As a result, the French have been spurred into taking a businesslike approach toward marketing outside their own borders.

The area which will be hurt by the new oil is the Middle East. No longer will it be able to count on supplying 80% of the French market.

But even this consequence isn't as drastic as it might seem. Middle East oil will be needed to supplement Saharan oil — unless the French make still more dramatic discoveries in the Sahara.

France's domestic demand . . . France hasn't matched the startling increases in oil consumption that marked the postwar years in some other European countries. Still, her requirements are rising at a rate that U. S. oil men would be happy to see at home.

French oil consumption has more than doubled in the past 8 years. But demand in France isn't climbing as fast as before the Suez crisis, as it is in Great Britain and West Germany.

Demand in France showed a steady 12% annual increase until the Suez crisis broke the upward curve. The trend was never reinstated.

But oil consumption jumped more than 10% to about 455,000 bbl. daily in 1960, in contrast to a 5% increase in 1959. And 1961 should bring as much gain as last year, or even more.

Additional gain would be a cinch if the French Government bowed to pressure to reduce prohibitive taxes on gasoline. The French motorist pays a whopping 74% in taxes every time he buys a liter of gasoline for his small car. This pushes the over-all cost of gasoline to 75 or 80 cents a gallon.

France is becoming one of the most automobile-conscious nations in Europe, and a cut in gasoline taxes would make it more so.

Although French oil men are wary of predicting government action on a tax cut, the light Saharan crude with its high gasoline cut (more than 40%) will create a gasoline surplus in France.

The country already faces the problem of a surplus of light products from African oil, and marketers are looking for methods of using them. There is speculation that surplus naphthas may be used as boiler fuel.

Barring a major setback to industrial and economic growth, France should be consuming at least 775,000 bbl. of petroleum products daily by 1965.

Closer look at potentials . . . The French discovered oil in the Sahara in 1956, and when it became apparent a year later that the country had at least two major oil fields, government officials went a little wild.

On the basis of the Hassi Messaoud discovery well, they talked about reserves of 7 billion barrels. And French politicians confidently discussed breaking away from dependence on Middle East oil.

French engineers in the field weren't so enthusiastic.

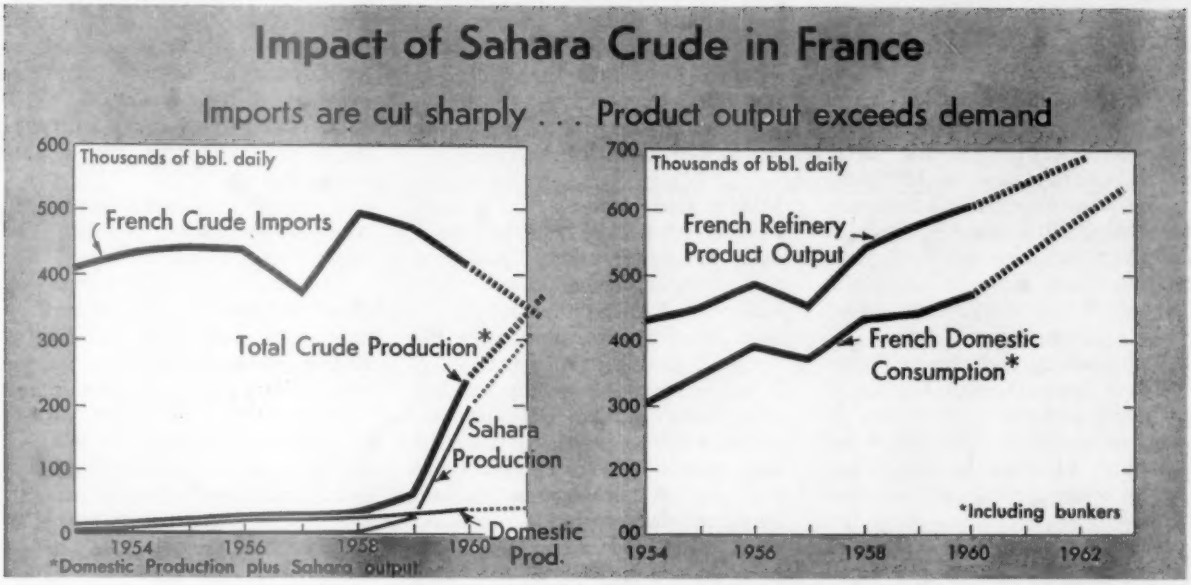
Today government officials and politicians have sobered a great deal.

Unquestionably, the French have oil reserves of a major caliber in the Sahara. This is proved by the fact they have been able to produce almost 62.5 million barrels of high-quality oil there since December 1957.

But developments in the big Hassi Messaoud field, that spark-plug of early enthusiasm, haven't been as heady as some French oil men expected.

The field now has 64 wells on production in two sections. The northern portion of the field is being developed by the privately controlled Cie. Francaise de Petroles, and the southern half by the government firm of S. N. REPAL.

Hassi Messaoud's surface area is tremendous. The limits of the field still haven't been delineated, especially to the northeast. And because the deep Cambro-Ordivician


Impact of Sahara Crude in France
Imports are cut sharply . . . Product output exceeds demand
Thousands of bbl. daily
French Crude Imports
Total Crude Production*
Sahara Production
Domestic Prod.
*Domestic Production plus Sahara output
Thousands of bbl. daily
French Refinery Product Output
French Domestic Consumption*
*Including bunkers

sandstone pay is so widely eroded, individual-well potentials vary all over the lot.

The pay is extremely tight and productive potential of wells ranges from about 380 bbl. daily to as high as 15,000 bbl. daily. The overall average is about 2,300 bbl.

According to the French, oil in place at Hassi Messaoud is estimated at more than 28 billion barrels but only 15% of this can be recovered by primary methods.

This would give the field an effective primary reserve of about 3,850,000,000 bbl., or about half the original estimate.

In spite of some of these downgrading elements, Hassi Messaoud produced on a steadily rising curve throughout last year. It pushed a daily average of 160,000 bbl.

The field's crude is moved through a 410-mile, 24-in. pipeline north to a loading terminal at Bougie on the Mediterranean coast.

Hassi Messaoud already has a 60,000 - bbl. - daily crude stabilization plant. Now a project is under way to build a 4,000-bbl.-daily atmospheric distillation unit to make products for local distribution, and facilities are due to be completed in June.

The Algiers refinery . . . Construction of a 50,000-bbl. refinery, the first for Algeria, will be started sometime this spring by a group of eight oil companies.

The new plant, to be built outside Algiers, is designed to meet the product needs of Algeria. But it will have a wide margin of over-capacity.

Algerian consumption in 1959 was about 22,000 bbl. daily, with another 6,000 for bunkers.

The refinery planners expect this local demand, plus bunkers, to rise to about 32,000 bbl. daily by 1965.

The refinery will be supplied by Hassi Messaoud crude moved by tanker from Bougie to Algiers, and then from the seaport to the refinery via a relatively short 20-in. pipeline.

The plant itself will consist of an atmospheric distillation unit and a catalytic reformer. Low sulfur content of the Hassi Messaoud crude makes it possible to dispense with hydro-treating units and other expensive treating equipment.

The new refinery will be built under the eye of Cie. Francaise de Raffinage, the refining affiliate of Cie. Francaise de Petrole, which will also hold a 12% interest in the plant.

CFP itself will own 20% of the refinery and S. N. REPAL 10%.

Other companies with interests are Shell Algeria, 18%; Esso (Mediterranean) 17.6%; Societe Francaise des Petroles BP, 10.4%; Mobil Francaise, 6% and Beryl, 6%.

Other fields . . . In the Eastern Sahara, about 350 miles from Hassi Messaoud, CREPS has developed a

New Producer Hailed in Southeastern Sahara

THE southeastern Sahara apparently has another commercial oil field to add to its growing roster of small but highly prolific producers.

The French last week were talking in terms of "another Edjele," the Sahara's first oil discovery which is a major supplier to the Edjele-La Skhirra pipeline.

The new discovery is Tin Fouye, which tested better than 1,500 bbl. daily on repeated tests of a Devonian sandstone between 4,232 ft. and 4,461 ft. It is being drilled by Cie. de Recherches et d'Exploitation de Petrole au Sahara, in which Royal Dutch-Shell has a 35% interest.

The field is about 48 miles east-northeast of Fort Flatters and just about 100 miles west of Ohanet, the newest major find in the southeastern part of the Sahara. Tin Fouye is near the route of a 30-in. pipeline which will link Ohanet, and eventually Edjele, with the big Hassi Messaoud field to the northwest.

CREPS was logging the new discovery last week and planned to deepen the hole. Location for the first stepout will be fixed after a study of the logs.

complex of shallow, highly permeable fields which produce a good quality crude.

This company, in which Royal Dutch-Shell has a 35% interest, discovered Algeria's first oil at Edjele. The field now has 110 wells.

The joint French-Shell company has completed another 70 wells at Zarzaitine and these two fields were pouring more than 155,000 bbl. daily into a newly completed 24-in. pipeline at the end of 1960.

The pipeline originates at Edjele and goes north through Tunisia to a loading terminal near Gabes. It went into official operation last September 11 when the first tanker loaded Sahara crude at the two-berth jetty.

The line's single pump station at In Amenas will be supplemented next April by a station at Fort Saint, near the Tunisian border, which will boost the line's potential to about 170,000 bbl. daily this year.

CREPS plans to add the 13-well Tiguentourine field and several other small fields to the system at In Amenas in 1962.

There have been other successes, but nothing that apparently is in the class with these fields.

Once the French talked about a 1,000,000-bbl.-daily potential for the Sahara. Now they talk in terms of 500,000 to 600,000 bbl. daily in 1965.

If French domestic consumption continues at its present rate there would still be a 225,000-bbl. gap not filled by Saharan oil in that year, even if every barrel of Saharan production went to France.

Middle East imports . . . French imports of Middle East oil have been sliding from the post-Suez peak of nearly 500,000 bbl. daily in 1958 and will continue the downward trend as more and more Saharan oil moves into France.

In the first 10 months of last year, total Middle East imports dropped 13% compared with the same period of 1959. This trend will certainly continue, but fuel-oil output of Saharan crude is far too small for France to drop all imports of the heavier Middle East crude with high fuel-oil content.

In addition to the fact that France must have the fuel oil, the French own 23.75% of the present 975,000-bbl. daily output of Iraq and the same percentage of Qatar's 172,000-bbl. daily production.

Iraq's production rose more than 14% last year. An income-hungry government will continue to prod the companies who produce Iraq's oil to keep this production on the rise. France will have to take her share of the production whether she needs it or not.

In the face of reduced estimates of Saharan production and greater French demand, the steadily rising rate of Iraq production is going to mean problems for the French in disposing of both crudes.

At present they are concentrating on moving the light, high-quality Saharan crude.

A number of sales have been made to American, German, and other European companies.

Just last month CFP opened its first "Total" service station in England. CFP hopes to increase its British outlets to at least 20 garages selling gasoline to motorists.

S. N. REPAL and RAP, a sister government company which owns the lion's share of CREPS' production, have leased a Belgian refinery and expect to market its output in Holland and Germany as well as Belgium.

These will certainly not be the only marketing efforts as once oil-thirsty France assumes the position of a big supplier and hunts actively for outlets in Europe.

Saharan oil isn't going to be the bitter dose that some thought it would be, but it may not go down quite as easily as an ice-cream soda, either. It is going to be available and the French are going to battle for a place in the oil-marketing sun.

And the European market once enjoyed almost exclusively by the Middle East is not going to expand quite as rapidly as it has in the past.

New Maracaibo Tests Planned

VENEZUELA's new national oil company plans to start drilling operations in Lake Maracaibo before mid-year.

The government entity, Venezuelan Petroleum Corp. (CVP), intends to drill offset wells to existing production on blocks held by private operators.

Specific location for the first test has not been disclosed. But it probably will be somewhere in the vicinity of a Shell block and two Phillips blocks.

CVP will hire a drilling contractor for the first well. Commercial production is expected by the end of the year.

The wells will be located on a 332,940-acre concession in the mid-lake area.

This L-shaped tract was handed to CVP by the government last year. The semi-proved acreage includes National Reserve Blocks 71, 74, V-580, V-578, and open acreage.

CVP expects to arrange with a private operator for the use of transport and storage facilities. It may also try to make a marketing deal with an established company.

Once production is achieved, the government company plans to push through a unitization program with neighboring operators.

Under the terms of its formation, CVP is supposed to compete on an even basis with private firms. It must pay royalties and taxes on the same basis as foreign companies, and turn over 50% of net profits to the government.

The biggest hurdle may be financing. CVP has an initial budget of 7.5 million bolivars, or about $2.3 million.

No further funds have been allotted in the budget for the next 4 years. The finance minister, Dr. Tomas Enrique Carrillo Batalla, has warned that the new company must get along on its present resources (OGJ, Jan. 9, p. 64).

One problem looming for the new concern is the pay scale for its workers.

If it offers employes less in wages and fringe benefits than amounts paid to other government workers under a collective contract, widespread dissatisfaction could arise. If it matches the contract, lower-paid employes of other government agencies may clamor for better treatment.

OPEC Won't Try Oil Proration Soon

• Venezuela's Perez Alfonzo lifts curtain of secrecy around Caracas meet just enough to assure oil world that OPEC members don't believe proration is needed at the moment. Details on what was discussed are still unknown.

PRORATION of oil production will not be tried by the six-nation Organization of Petroleum Exporting Countries, at least for the present.

That is about the only clear-cut development that penetrated the carefully constructed wall of secrecy surrounding the week-long meeting of OPEC at Caracas.

Doggedly tight-lipped, Arab and Iranian delegates to the meeting left Venezuela for their Middle East homes while the oil industry and an interested oil-consuming world wondered about their future plans.

Before the meeting broke up, the group elected Fuad Rouhani, deputy chairman of National Iranian Oil Co. and chief of the Iranian delegation, as president of the OPEC board.

The group will hold another meeting about the middle of this year at Tehran.

Exactly what the members of OPEC did, or what they decided would be the best method for stabilizing the price of oil at a high level, apparently will be a kept secret until February 15. That is the date set for a simultaneous disclosure of what went on in Caracas. Announcements will be made in six capitals.

The proration question . . . Except for vague generalities about the fact that OPEC has been "strengthened" by the Caracas meeting and that its formal structure is becoming stronger, little has been divulged.

The only exception to a policy of absolute silence came when Dr. Juan Pablo Perez Alfonzo, Venezuela's oil minister and host to the conference, bent slightly to the repeated questions of newsmen.

Perez Alfonzo admitted that much of the discussion had centered on production controls of some type, but emphasized that OPEC does not consider proration is needed now. He said discussions on this subject were aimed at control "when necessary" if future conditions require a policy change.

The moderation implied in the Venezuelan's statement indicates that not all members of OPEC believe proration of oil on an international basis is workable.

Perez Alfonzo, Abdullah Tariki, the Saudi Arabian oil minister, and Mohammed Salman, Iraq's newly appointed oil minister, all favor some form of production controls. The Shah of Iran and high officials of the Kuwait Government have made it plain they are less enthusiastic about any kind of production control which would apply to their oil.

This creates a delicate political problem for OPEC since any action taken at Caracas, or at any meeting, is meaningless unless ratified by the governments involved.

Election of Fuad Rouhani as head of OPEC is being widely regarded as a basic, shrewd, and essential move from a very elemental political standpoint.

His country is the weak spot in any attempted wall of solidarity among the Middle East producers.

Iran, which is Moslem, but not Arabic, turns a deaf ear to any Pan-Arab appeal on oil questions. In fact, it makes no secret of the fact that it intends to try and regain the top producing spot it once held in the Middle East, whether or not this benefits Arab oil producers.

The secrecy . . . The secrecy surrounding the OPEC meeting was complete and designed.

Although besieged by Venezuelan newsmen, delegates refused to even discuss the sessions. One Middle East delegate candidly told a newsman he couldn't risk the possibility that his government would learn about what OPEC was doing through news accounts before he could report officially.

At least 40 Venezuelan policemen and secret agents were stationed in Hotel Tamanaco in Caracas, obviously to ward off newsmen who approached delegates' rooms.

Security was so tight at the White Palace that Perez Alfonzo himself was refused admission at one session because he couldn't show an overzealous guard an invitation. Someone finally recognized him as the host and allowed him to enter.

The secrecy caused a great deal of suspicion in Caracas. Some Venezuelans look upon Perez Alfonzo's efforts to cooperate fully with the Arabs as harmful to Venezuela. They make no secret of the fact that they believe Venezuela will come out on the short end of any agreement.

La Esfera, one of the big Spanish-language papers in Caracas, embarked on a very critical campaign against Perez Alfonzo right in the middle of the OPEC meeting.

Red China Buys Fuel

SALE of 60,000 tons, or about 500,000 bbl., of gasoline and diesel oil to Communist China has been confirmed by Royal Dutch-Shell.

The purchase is believed to be the largest from western sources since Korean War restrictions were eased in 1958. Shell said that small lots of products not on the strategic embargo list have been sold to Red China for a year.

The orders have been placed by the Chinese through regular trade channels in Hong Kong. Deliveries are probably being made from Pulau Bukom, an island 4 miles off Singapore where Shell has storage and blending facilities.

The company emphasized that the products involved are not on the strategic embargo list, and they represent an "infinitesimal fraction" of Communist Chinese demand.

Hunt, BP Share Libya Rights

NELSON Bunker Hunt has farmed out 50% interest in his big Libyan concession to British Petroleum Co.

The Libyan Government has confirmed that BP acquired half interest in Block 65 in Zone III, southern Cyrenaica. The concession covers about 12,620 sq. miles.

The deal calls for BP to serve as operator and to drill at least six wells. Any discoveries will be developed jointly. The government approved the deal when BP agreed to surrender the depletion allowance on its own interest.

The first well, A1-65, is fighting lost circulation at 5,115 ft. The test is projected to at least 10,000 ft.

Hunt, a Dallas independent, acquired rights on the acreage 4 years ago.

Another Hunt concession, the 4,540-sq.-mile Block 2 in northern Cyrenaica, is not included in the deal. This block was acquired 6 years ago in the first round of awards, and 25% has been relinquished under the terms of the oil law.

BP holds acreage immediately to the north and east of Block 65. In Block 80 to the north, the company is drilling ahead from 8,510 ft. Block 81 to the east includes all territory between the Hunt concession and the Egyptian border.

BP has another wildcat drilling in Block 36 along the coast of Cyrenaica, and in Block 34 in Tripolitania.

Shell-Condor Trims Colombia Drilling

SHELL-CONDOR is reducing its drilling operations in Colombia after spending $23 million in a futile search for oil in the country's western plains.

The decision came soon after a successful, 1,260-bbl. stepout in Cristalina 4 in Middle Magdalena Valley. But the company has had bad luck elsewhere. Its Tame 1 wildcat in the Llanos foothills has been abandoned at 13,290 ft.

Shell-Condor expects to keep one wildcat and one field rig running. Present output of 38,000 bbl. daily is mostly from Casabe and Yariqui fields.

The state oil agency, Ecopetrol, also chalked up an exploration success in Middle Magdalena Valley with a new pool wildcat. Llanito 7, brought in on the old De Mares concession, tested 3,120 bbl. daily on a 4½-hour trial. The pay is in Zone B between 5,644-5,752 ft.

Sinclair and Intercol are studying a possible pipeline connection to move crude from a last year's discovery to Barranca refinery on the Caribbean coast. The discovery, Santos 1, would be linked to the Andian pipeline, a 335-mile 10-in. common carrier.

Ghana Refinery Deal Made

HALF INTEREST in a new 20,000 to 30,000-bbl. refinery in Ghana will be handed to the government 10 years after the plant goes into operation.

An offer to turn over 50% ownership in the $25,200,000 plant helped the Italian oil agency, ENI, win the right to build the country's first processing facilities. The refinery is expected to go into operation within 18 months at Tema, a new port on the West African Coast, 16 miles from Accra.

Enrico Mattei, head of the Italian organization, also agreed to let Ghana control the percentage of profits, and to set prices on finished products.

FOREIGN BRIEFS . . .

A 10,000-bbl. platformer has gone into operation at Gelsenberg Benzin's 95,000-bbl. plant in Gelsenkirchen-Horst, West Germany. Lurgi built the unit, using a UOP process. Construction will be started by Lurgi soon on a benzene plant which will be used in combination with a gasoline stabilizer and an older 7,500-bbl. reformer.

Capacity of Safaniya field in Saudi Arabia will be raised from 215,000 to 240,000 bbl. daily in the first half of this year. The increase is being accomplished by a 16-mile 30-32-in. loop between Safaniya and Khursaniyah and the addition of other offtake facilities.

Half-interest in Argentine operations of White Eagle International has been acquired by Cities Service. White Eagle, subsidiary of a Tulsa-based independent, is carrying out a water-flooding program on a 2,000-acre area which is part of 14,000 acres held by Astra Cia. Argentina.

A bunkering station has been set up at Hamburg, West Germany, in another move by Total to expand foreign markets. Total is the marketing arm of CFP. The CFP affiliate in Hamburg is Ste. des Petroles Mory.

A $42.3-million refinery has been completed at Schwechat, near Vienna. It will process Austrian crude and supply marketing subsidiaries of Socony Mobil and Royal Dutch-Shell. The plant has a capacity of 1.8 million tons annually.

An Italian gas field has been opened by Petrosud. Gas is being moved from Cellino field, near the Adriatic Coast, to Teramo by a small-diameter line. The system moves 2,400 M.c.f. daily.

A new exploration firm has been created in the pooling of Australian oil and gas concessions belonging to Texas American Oil Corp., Landa Oil Co., and Nortex Oil & Gas Corp. The new United Australian Oil, Ltd., jointly owned by the three companies, will have about 28 million acres of oil and gas concessions in the Northern Territory, Queensland, and New South Wales.

A polypropylene plant with a capacity of 30,000,000 lb. a year is being built in Japan by AviSun and Shin Nippon Chisso Kiryo, K.K. Completion is expected by early 1962.

The OIL AND GAS JOURNAL

REVIEW-FORECAST

What the next 64 pages reveal . . .

- This year will be a better year for the oil business because of what the industry did for itself in 1960.
- All of the drilling gain this year will be in wildcats. Plans call for 10,651 wildcats, 36,313 field wells, and 195,538,000 ft. of hole.
- Drilling was off 5,013 holes in 1960 to 46,751. Development drilling dropped 10.97%. Wildcats decreased only 4.35%. Condensate and gas wells showed gains.
- Rotary-rig count reached a low point in August. Average for every month was below corresponding month in 1959.
- Domestic crude producers supplied only 71.5% of total demand last year. Ten crude producing states showed losses for year.
- 1960 was a good year for gas sales. Marketed production approached 11 trillion cubic feet.
- Crude reserves gained less than 10 million barrels in 1960. Gas liquids increased 301 million.
- Imports have stabilized at about 25% of crude production or 18% of domestic demand.
- Domestic demand averaged 9,631,000 bbl. daily in 1960 after very small gain. Increase for 1961 is expected to be 2.12%. Gain in production will exceed gain in demand.
- Crude runs at refineries topped 8,000,000 bbl. daily for the first time last year. Operating rate was very high in June-September period.
- Gas liquids accounted for 11.75% of total petroleum production last year. LPG showed smaller percentage gain than total gas liquids.
- World production of crude climbed above 20,000,000 bbl. daily in 1960.
- Crude and product prices were a little firmer last year. Gasoline prices improved in last half.
- Free World pipeline construction may reach 27,000 miles in 1961.
- Except for spotted success, 1960 was the year of exploratory lemons. The first few days of the new year, however, promise better days in 1961.

1961—a year of creeping improvement

THIS YEAR will be a better year for the oil business—not because 1961 as such will be much better but because of what the industry did for itself in 1960.

A year or so ago it appeared to many that the oil business was on the skids and destined to drown in a flood of surplus oil and red ink. Today things look far more promising because the industry got hold of itself and reversed its direction.

During 1960 the oil business bottomed out, stabilized, and turned the corner. It faced up to its problems and began to solve them, thus laying the groundwork for reasonably profitable operations.

By one means or another it contrived to contain its surplus capacity, though not entirely in refining. By and large it kept supply fairly well in balance with demand, and worked off much of its excessive inventories that were acting as price depressants.

It adjusted to a small rate of increase in demand by shutting in some capacity and using capital investment to improve efficiency rather than to add still more capacity. To increase profits per unit it undertook an austerity program of cost cutting, automation, and corporate reorganization.

Better management throughout the industry marked 1960. There was closer attention to supply-demand trends, to inventories, to efficient operations, and particularly to markets. Considerable progress was made in eliminating obsolete and unprofitable marketing methods and practices that invited price wars.

As a result product prices recovered much of their loss, crude prices stiffened, and industry earnings improved.

Statistically 1960 was virtually trendless, and 1961 will be about the same. So the outlook is: The oil business won't get much better very fast, but it definitely isn't going to get worse.

...Supply-demand balance improved

A GREAT BALANCING ACT was undertaken by the industry last year—trying to balance supply with demand. It was reasonably successful, but it took a cut in production to achieve it.

Total demand was up 1.79% but new supply up only 0.65%, thus reducing stocks by 21,600,000 bbl. Imports were held to a 1.57% rise and domestic production to 0.42%. But since natural-gas liquids grew so fast (6.48%), crude production actually dropped by 0.31%—22,000 bbl. per day. Tight Texas proration, plus assists from neighbor states, finally brought a balance in crude.

Refiners didn't do so well. True, runs to stills went up only 0.31%, but product stocks were way too high at the start and were brought down only 2,500,000 bbl. during the year. And the runs were highest during the season of slackest demand, which was quite unbalancing.

The biggest worry was the poor domestic demand for gasoline, the industry's biggest product in gallons and dollars. It went up only 61,000 bbl. per day (1.5%), which was far less than the industry was accustomed to and geared to. The popularity of economy cars got most of the blame, along with high gasoline taxes and the diversity of nonmotoring recreations. So oil men readied a big campaign to induce people to drive more in 1961.

All in all, 1960 ended with a much better balance than its start, and with some valuable balancing lessons learned. If refiners can just hold their horses enough to work down products stocks, 1961 will show even better results. For how this balance may be achieved, see our detailed forecast on page 138.

Just inching along

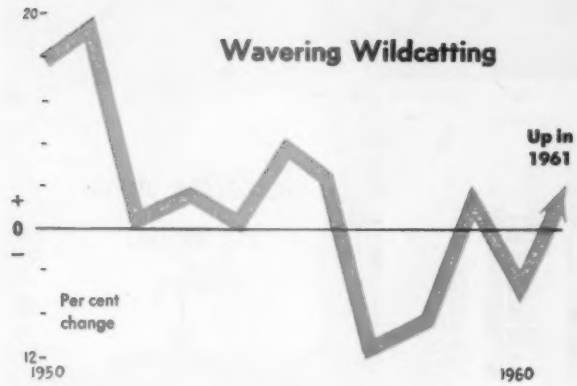
	1960		1961	
	000 B/D	% change	000 B/D	% change
Total demand	9,835	1.79	10,031	2.00
Domestic demand	9,631	1.90	9,835	2.12
Gasoline	4,128	1.50	4,211	2.01
Distillate	1,866	3.21	1,905	2.09
New supply	9,776	0.65	10,055	2.87
Imports	1,808	1.57	1,810	0.11
Production	7,968	0.42	8,245	3.48
Crude	7,032	−0.31	7,272	3.41
Nat.-gas liquids	936	6.48	973	3.95
Refinery runs	8,067	0.09	8,224	1.95

. . . Drilling took a low blow

THE EXCESS crude-producing capacity and the industry's low profits hit drilling hard in 1960. Total completions were 46,751 wells, a drop of 5,013 from the 51,764 completions in 1959. The number was the smallest since 1953, and the total footage the least since 1952.

The current year, according to operators' initial plans, will be about the same as last except that there should be more exploratory wells. In 1960, wildcats were 20.6% of all wells drilled, compared with 19.8% in 1959. This upward trend is encouraging for the reserves outlook because there have been increases in wildcat completions in only 5 of the past 10 years.

There was a decided drop in the number of total completions classified as crude producers but an increase in gas and condensate producers. However, the



number of wildcat discoveries in each of the three categories was virtually the same as in 1959.

The number of rotary rigs operating in 1960 was the lowest since 1947. This was due not only to small number of completions but also to improved technology which permitted faster drilling. There was intensified research to speed drilling and cut costs, so the expectation is that the average number of rigs in operation will not increase much even if total completions and crude production pick up during the next year or two.

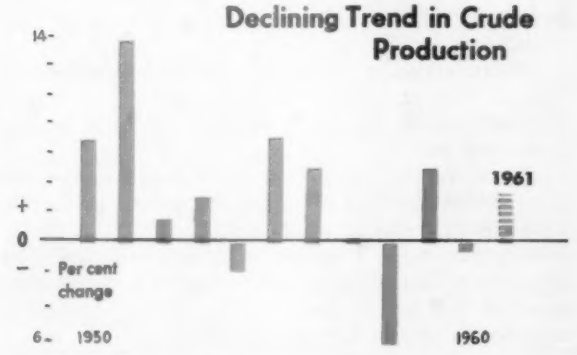
. . . 1961 production to hit new peak

THIS YEAR will bring the highest U. S. crude production in history—but it won't seem like it to many producers. As during 1960, their output will be held well below capacity by proration and market limitations.

But last year's curtailments did such a good job of reducing crude stocks that this year production can increase a little faster than the growth rate of petroleum products—an unusual exception to the recent trend.

Last year crude production fell 22,000 bbl. per day. This year it should rise about 240,000 bbl. per day, due to a tiny increase in product demand, a tight rein on imports, and a modest rebuilding of crude stocks.

Early last year the crude market was in bad shape. There were excessive stocks, purchaser proration, unconnected wells, and scattered price cuts. Because some states drastically prorated output, these conditions were largely cleaned up.



As a result, the average crude price inched up 2 cents to $2.92 per barrel, reversing the 1958-59 slide and actually by reaching the highest level in 11 years except for the short-lived Suez flurry of 1957-58.

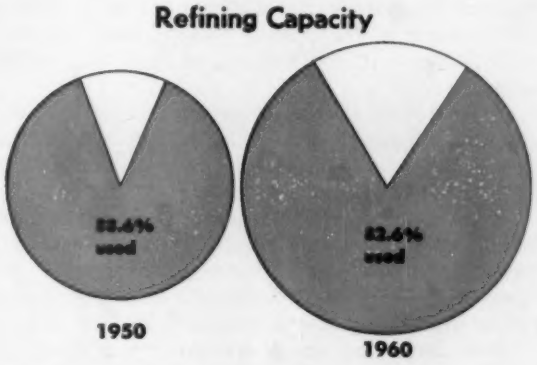
The expected small increase in crude output will bring the 1961 total only slightly above the 1956 mark. The fact that crude demand has been almost stationary for 6 years is usually blamed on imports, but a big part is due to postwar increases in natural gas and natural-gas liquids which have risen more than twice as fast as crude. Last year gas production was up 5% and NGL up 6.5%. NGL now takes nearly one-eighth of the total market, compared with one-twelfth 10 years ago.

. . . Refiners may have learned lesson

THE REFINING END of the business will be a little better this year—if refiners follow some of the lessons they learned in 1960.

Last year they held their runs to an average of 8,067,000 bbl. per day, which was only 0.09% above 1959, but even that was too high considering demand and stocks. The main trouble was that runs were high all during the summer, the season of lowest demand.

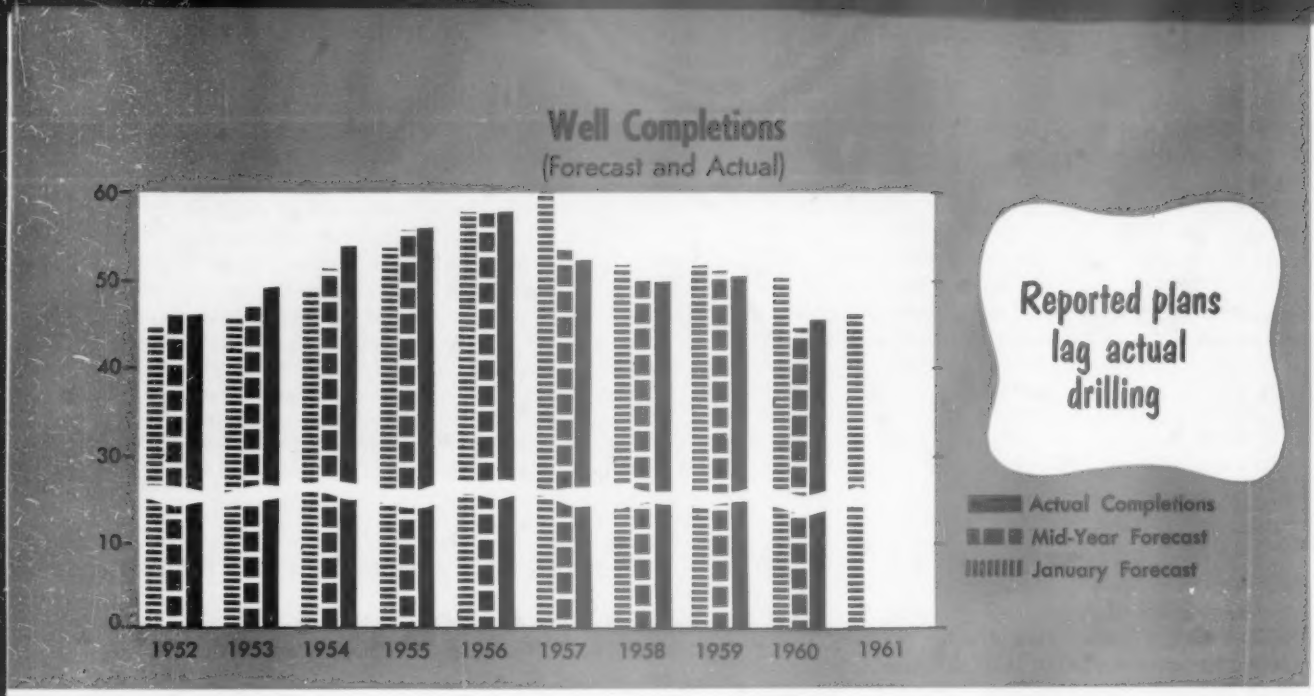
This year it appears that runs can safely average about 8,200,000 bbl. daily. If so, products stocks will be reduced by around 11 million barrels, which will leave them still on the high side but be a better showing



than the 7-million-barrel reduction of 1960. However, this will mean an increase of only 1.95% in the operating rate while the products demand is expected to rise 2.12%.

Even though runs went wild during the summer, the prices of most products stiffened appreciably in the fall, and refiners' gross money realization from a barrel of crude improved. This was due partly to the fact that runs and stocks weren't any higher than they were, but perhaps more to the greater attention refiners paid to their markets. There appeared to be a widespread effort to avoid dumping distress surpluses and to prevent price wars from spreading. The resulting stiffening in prices late in 1960 reversed the decline that had been under way since the Suez Canal reopened.

So the basis for predicting better conditions for refining is the expectation that refiners themselves will continue efforts to prevent price-weakening surpluses.



Operators plan 46,964 wells in '61

OIL OPERATORS' PLANS call for a definite increase in wildcat drilling this year. Since the increase in budgeted expenditures for wildcatting is larger than the total increase in the drilling budget, there will be a small decrease in the number of field wells drilled during the year.

Reports from a large number of operators in every important producing area in the country represent the basic data for the Journal's forecast of 10,651 wildcats, 36,313 field wells, and 195,538,000 ft. of hole.

A recap of reports from small-to-average-size producing companies shows plans for increasing wildcat drilling 16% this year. Large-company reports show a gain of about 7.5%. Combined forecasts for all states give an over-all increase in wildcat drilling of 10.54%.

Both large and small operators plan fewer development wells than they drilled in 1960. Large operators say they expect to cut field-well drilling by about 7.3%. Other producers are making a much smaller cutback. These reports represent the basis for the Journal's forecast of a 2.2% reduction in development drilling this year.

The increase of 1,016 wildcat wells this year combined with a decrease of 803 development wells leaves a small net gain of 213 holes for the year.

Operators will drill about 195.5 million feet of hole in 1961 for a gain of 4.8 million feet over the total for 1960. Footage will be up 2.54% compared with the projected 0.46% increase in number of holes. There is a reason for the difference.

All of the increase will be in wildcat drilling, and wildcat wells are deeper than development wells even for a given area. For example, the average wildcat for the country last year was 4,601 ft. deep. The average field well was 3,944 ft. The average Oklahoma wildcat was drilled to 5,133 ft., compared with 3,374 ft. for the average field well.

Industry drilling will shift with changing conditions during the year. Most company programs for 1961 are based on moderate increases in gross income from oil and gas. If demand drops sharply during the year, the change will show up as reductions in drilling programs. Since the Journal's forecast is based on company reports it tends to reflect company planning at the first of the year. Revised plans show up as changes at midyear.

The chart at the top of the page gives a 10-year picture of Journal forecasts and actual well completions. The first bar in each series represents the Journal's forecast in the Review and Forecast issue at the end of January. The second bar is from the forecast in the Midyear issue. The third bar shows actual completions for the year.

In 1954, operating companies increased drilling programs between the first of the year and midyear. They boosted them again during the last half. The reverse was true in 1960. Many companies cut drilling budgets as much as 10% between January and the end of June.

If production of crude and gas has an unexpected increase this year, you can add another 2% to the drilling forecast. Cut 2% if demand outlook is gloomy in the first half.

Plans for drilling in western Canada follow the same general pattern scheduled for operations in the United States. Wildcat drilling will be up about 2.5%, but the decrease in development drilling will more than offset the wildcat gain. Total completions for the year probably will be off about 4.2%. Drilled footage is expected to show a loss of about 3.4%.

10,651 wildcats, 36,313 field wells seen for '61

State—	1961 forecast				Change from 1960			
	Wildcat wells	Field wells	Total wells	Total footage*	Wildcat wells	Field wells	Total wells	Total footage*
Alabama	13	34	47	412	6	−4	2	−37
Alaska	12	42	54	547	4	27	31	317
Arizona	24	12	36	91	1	....	1	5
Arkansas	165	530	695	2,501	20	60	80	288
California	389	1,302	1,691	7,430	87	−105	−18	−17
Colorado	330	326	656	3,250	−28	−22	−50	−225
Florida	7	....	7	84	2	....	2	24
Illinois	430	1,970	2,400	4,900	−72	99	27	77
Indiana	376	630	1,006	1,372	10	−73	−63	−87
Kansas	1,099	2,920	4,019	12,128	43	−312	−269	−316
Kentucky	252	1,809	2,061	2,794	29	−148	−119	−120
Louisiana	**818**	**3,026**	**3,844**	**29,974**	**266**	**−129**	**137**	**1,298**
North	292	1,255	1,547	5,731	24	71	95	362
South	442	1,328	1,770	18,188	192	−187	5	120
Offshore	84	443	527	6,055	50	−13	37	816
Michigan	210	505	715	2,440	−36	−146	−182	−614
Mississippi	300	421	721	7,076	33	−7	26	244
Montana	157	160	317	1,489	−11	−25	−36	−176
Nebraska	412	450	862	4,682	20	−54	−34	−192
New Mexico	**318**	**1,622**	**1,940**	**9,672**	**68**	**22**	**90**	**446**
East	230	919	1,149	5,860	50	−66	−16	−58
West	88	703	791	3,812	18	88	106	504
New York	46	300	346	576	2	44	46	67
North Dakota	88	192	280	1,786	6	−9	−3	−21
Ohio	63	1,077	1,140	2,874	8	33	41	110
Oklahoma	866	4,510	5,376	19,662	166	408	574	2,230
Pennsylvania	31	604	635	1,832	11	−236	−225	−585
South Dakota	7	....	7	25	−4	−11	−15	−113
Texas	**3,542**	**12,382**	**15,924**	**69,007**	**376**	**−33**	**343**	**2,514**
District 1	430	553	983	2,682	45	−188	−143	−342
District 2	204	509	713	4,877	20	−63	−43	−213
District 3	235	1,006	1,241	8,710	17	61	78	568
District 4	332	884	1,216	6,745	30	112	142	785
East (5 and 6)	362	1,056	1,418	6,617	89	18	107	548
District 7-B	650	1,420	2,070	5,954	19	−180	−161	−442
West (7C and 8)	740	3,480	4,220	21,135	108	136	244	1,186
District 9	519	2,490	3,009	7,462	35	71	106	278
District 10	70	984	1,054	4,825	13	....	13	146
Utah	112	116	228	1,295	16	−31	−15	−88
West Virginia	24	760	784	1,976	13	−113	−100	−185
Wyoming	485	600	1,085	5,489	50	−39	11	80
Miscellaneous	75	13	88	174	−70	1	−69	−89
Total United States	**10,651**	**36,313**	**46,964**	**195,538**	**1,016**	**−803**	**213**	**4,835**

*Thousands of feet.

. . . and Canada, 650 and 1,683

Province—	1961 forecast				Change from 1960			
	Wildcat wells	Field wells	Total wells	Total footage*	Wildcat wells	Field wells	Total wells	Total footage*
Alberta	457	1,146	1,603	9,869	39	−67	−28	−184
Saskatchewan	95	402	497	1,965	−23	−57	−80	−318
Manitoba	12	47	59	133	1	−10	−9	−17
British Columbia	70	88	158	818	2	15	17	81
Northwest Territories	16	.....	16	55	−3	....	−3	−10
Western Canada	650	1,683	2,333	12,840	16	−119	−103	−448
Ontario	.....	.....	256	320	.....	.....	−50	−63

*Thousands of feet.

Total completions in 1960 plummet to

TOTAL COMPLETIONS in the United States in 1960 reversed the 1959 upward trend, falling to 46,751 wells. This was a decrease of 5,013 wells from the 51,764 completed in 1959.

The downward trend in drilling began early in the year, continuing month by month to lag behind 1959 figures. For a few months in 1960 wildcat completions were running ahead of the previous year, but they too fell behind during the last half. The big completion states all fell behind previous year totals. Only Kansas and California of the bigger producing states showed gains over the previous year, and they were meager gains. Oklahoma, Texas, New Mexico, and Louisiana all dropped off in the number of new wells finaled. Important gains were registered in Indiana with its Spencer County boom, Michigan with its continued Scipio successes, Mississippi, the Appalachians where older areas are enjoying a revival plus increased gas exploration, and Wyoming with its big development in Sweetwater County's arch unit area.

Wildcats once again begin decline

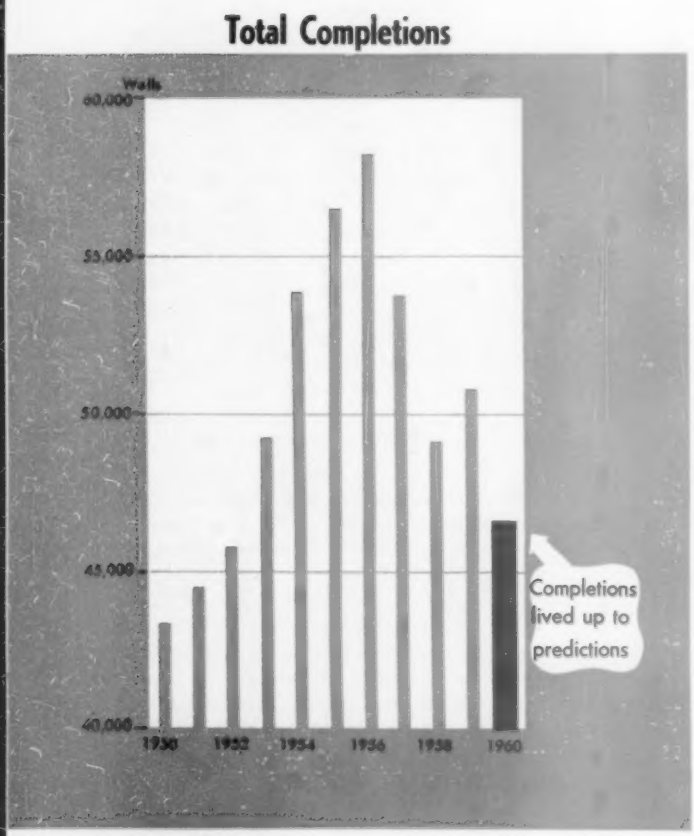
. . . as drillers finaled 9,635 test wells. This compares to 10,073 in 1959. The 1960 wildcat scoreboard shows 853 new oil pools, 112 condensate strikes, 336 gas-field openers, and 8,334 exploratory failures. Wildcatters put down 44,329,650 ft. of hole compared to 48,322,611 ft. in 1959.

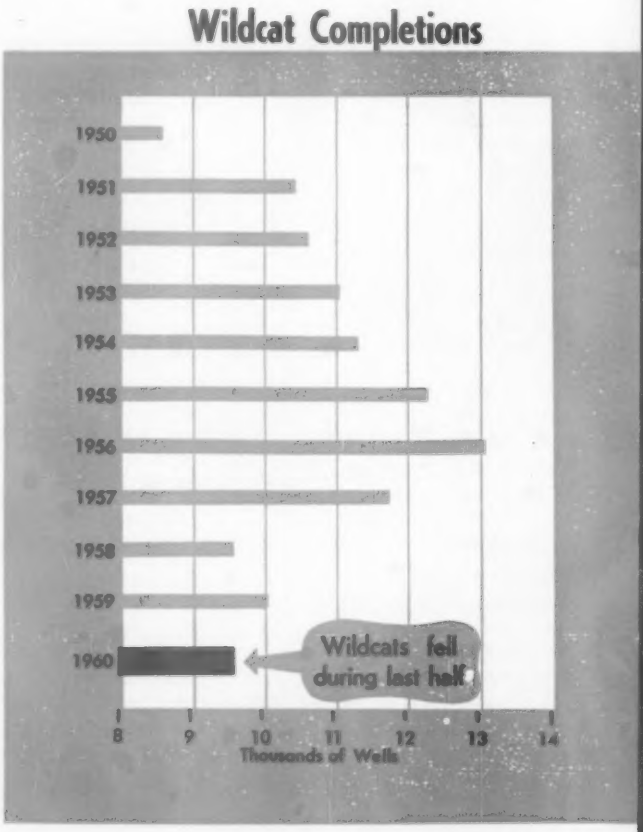
Wildcat wells accounted for 20.6% of all wells drilled, compared with 19.8% in 1959. Average wildcat depth in 1960 was 4,601 ft. compared to 4,797 ft. in 1959. Success ratio of all wildcats drilled in 1960 was 8.9% for oil, 1.2% for condensate, 3.5% for gas, and 86.4% for dry holes.

Oil-Hunting—1960

Although exploration suffered a numerical setback in 1960, wildcat events were significant in nearly every oil province in North America. As usual, some areas stood out above the others. The year's most important events occurred in the Rocky Mountains, Texas, Oklahoma, the Williston basin, and Nebraska.

In the Rockies. This multistate province once again bagged the year's big newsmaker . . . Lisbon. Utah's Lisbon area on the north side of the Paradox basin first hit the exploratory headlines in late 1959, but its development didn't begin until January 1960. Pure Oil Co.'s 1 Northwest Lisbon was finished for more than 500 bbl. daily from Devonian. The field began to develop with gas and oil being found in Devonian and Mississippian. The sister well to Northwest Lisbon,





46,751, down 5,013 for the year

Southeast Lisbon in San Miguel County, Colorado, also was completed, opening first Mississippian gas production in Colorado. This field also began to grow with wells finding gas and condensate in Mississippian and Devonian.

... **Wyoming.** As in 1959, this state took first place in Rockies wildcatting success. Two corners of Wyoming, Green River and Powder River, held regional exploratory interest. The growth of the Patrick Draw-Beacon Ridge-Arch units in Sweetwater County as a major source of new oil for the Rockies highlighted the year's events in Wyoming. Almond Cretaceous sand oil and gas production is far from being defined to date.

Both Cretaceous and Pennsylvanian rocks con-

Top discoveries of 1960—U. S., Canada, Overseas

PARADOX BASIN

With the official completion of Pure Oil Co.'s 1 Lisbon in San Juan County, Utah, set at 547 bbl. of oil daily from Devonian, Rocky Mountain exploratory interest centered on this northern Paradox basin field as wells were added during the year with both Devonian and Mississippian gas and oil production. Southeast Lisbon on the opposite and Colorado end of the Lisbon-Dolores anticline opened Mississippian production in a new area.

DELAWARE BASIN

A quartet of wildcats in far West Texas highlighted the year's news, but one of these took top honors. Atlantic Refining Co. 1 Kelly, in Pecos County, opened Texas' deepest production at 16,680 ft. in the Montoya Ordovician. Flow was 16,100 M.c.f.d. Mobil Oil Co.'s 1 Kathleen Moore, Pecos County discovery, opened the first Pennsylvanian production on the Texas side of the basin. Flow was 105 M.M.c.f.d. Mobil 1 State-Barrett on the far west side of the basin in Culberson County flowed 13,500 M.c.f.d. to give that remote producing area a Pennsylvanian strike. A triple-pay discovery in the channel area between Val Verde and Delaware basins flowed gas from Ordovician, Cambro-Ordovician, and Pennsylvanian. It was Shell-Humble 1 Blackstone-Slaughter, Pecos County.

ANADARKO BASIN, ARKOMA BASIN

The emergence of Kingfisher County in Central Oklahoma as a major oil-producing region for the Mid-Continent highlighted developments in the Sooner State. Deep Pennsylvanian gas discoveries scattered in southeastern Oklahoma started the ball rolling in what may become a major gas province for the nation.

SOUTHEAST NEW MEXICO

Deep Devonian and Pennsylvanian gas and oil discoveries dotted southeastern New Mexico heavily during the year. The rapid growth of the Abo-Permian reef trend across the northern shelf of the Delaware basin rounded out a highly successful drilling year.

SOUTHWEST TEXAS

Mobil Oil Co. moved the Deep Edwards trend about 55 miles northeast of the 1959 anchor in Karnes County into Lavaca County. Bright & Schiff opened the third Edwards oil field on the trend.

PACIFIC COAST

Offshore drilling in California picked up off the coast of Santa Barbara, but the year's big exploratory story on the West Coast was the real beginning of big gas exploring in the Sacramento Valley.

WILLISTON BASIN

After a considerable absence from the discovery fold, Williston bounced back with its best Devonian field opener to date. Murphy Corp. opened Tule Creek field in Roosevelt County, northeastern Montana, with flowing production at the hourly rate of 87 bbl. during tests of Nisku. This discovery started a flurry of offset drilling that may turn up a major Williston field this year.

ALASKA

Two new gas fields, one new oil field, and the successful development of Swanson River marked Alaska's best exploratory year yet. Kenai gas field will supply Anchorage with gas from three wells, and a new pool opened at a M. T. Halbouty wildcat on the Kenai Peninsula rounded out the gas news. Soldotna, adjoining Swanson River, is Alaska's new Hemlock Tertiary oil producer.

... And World-wide

CANADA

Deevelopment of 1959 discoveries highlighted western Canada exploration in 1960. The rise of Simonette River Devonian D3 reef field as a major producing area, the continued expansion of giant Swan Hills field in northern Alberta, and the fast development of major new gas reserves in British Columbia's northeast sector caused a decided change in previously submitted oil and gas reserves north of our border.

OVERSEAS

Last year was Africa's second big stint in its new role as a major oil producer. Libya and French Sahara oil reserves grew with giant strides. Africa appears destined to become the world's new oil frontier.

New oil finds in Bolivia, India, and Europe ended an exploratory year of many sides in the world. Fewer discoveries of major importance than in several years marred the first year of an expected bright oil decade.

How the 46,751 completions were distributed

	Total	Crude	Cond.	Gas	Dry	Service	Total footage	Average footage	Comp. 1959
Alabama	45	38	0	0	7	0	448,741	9,974	95
Alaska	23	12	0	3	7	1	230,372	9,926	17
Arizona	35	3	0	1	31	0	86,157	2,462	27
Arkansas	615	292	2	36	279	6	2,212,579	3,598	842
California	1,709	1,160	1	114	419	15	7,447,424	4,358	1,530
Colorado	706	119	9	116	462	0	3,475,195	4,922	809
Florida	5	0	0	0	5	0	60,332	12,066	7
Georgia	1	0	0	0	1	0	4,551	4,551	0
Idaho	1	0	0	0	1	0	1,182	1,182	0
Illinois	2,373	776	0	8	1,055	534	4,822,824	2,032	2,357
Indiana	1,069	345	0	12	699	13	1,458,518	1,364	880
Iowa	4	0	0	0	4	0	4,277	1,069	1
Kansas	4,288	2,040	1	200	1,818	229	12,443,871	2,902	3,959
Kentucky	2,180	768	0	264	722	426	2,914,439	1,337	3,365
Louisiana	3,707	1,685	335	282	1,395	10	28,675,634	7,736	3,781
North	1,452	621	2	230	598	1	5,368,447	3,697	1,517
South	1,765	799	257	44	657	8	18,068,180	10,237	1,853
Offshore	490	265	76	8	140	1	5,238,977	10,692	411
Michigan	897	357	0	26	428	86	3,054,219	3,405	656
Mississippi	695	308	30	9	347	1	6,831,980	9,830	645
Missouri	29	4	0	0	25	0	47,037	1,622	2
Montana	353	132	0	8	212	1	1,665,414	4,718	348
Nebraska	896	279	0	2	613	2	4,873,840	5,440	910
Nevada	3	0	0	0	3	0	11,762	3,921	2
New Mexico	1,850	1,014	46	374	401	15	9,225,984	4,987	2,077
West	685	197	32	351	96	9	3,308,154	4,829	908
East	1,165	817	14	23	305	6	5,917,830	5,080	1,169
New York	300	126	0	28	60	86	509,168	1,697	259
North Carolina	3	0	0	0	3	0	4,896	1,632	9
North Dakota	283	159	1	0	122	1	1,806,751	6,382	436
Ohio	1,099	454	0	260	304	81	2,763,850	2,515	1,133
Oklahoma	4,802	2,284	72	434	1,472	540	17,431,529	3,630	6,230
Oregon	11	0	0	0	11	0	40,206	3,655	2
Pennsylvania	860	256	0	269	91	244	2,416,950	2,810	648
South Dakota	22	7	0	0	15	0	138,181	6,281	23
Tennessee	92	10	0	2	80	0	78,962	858	58
Texas	15,581	7,880	807	732	5,755	407	66,492,798	4,268	18,526
Dist. 1	1,126	533	19	35	529	10	3,023,777	2,685	1,077
Dist. 2	756	175	120	126	334	1	5,089,550	6,732	796
Dist. 3	1,163	458	144	44	516	1	8,142,531	7,007	1,195
Dist. 4	1,074	274	152	121	516	1	5,959,888	5,549	1,342
East (5 & 6)	1,311	718	92	6	485	10	6,068,810	4,629	1,246
Dist. 7-B	2,231	998	30	106	1,060	37	6,395,670	2,867	2,623
West (7-C & 8)	3,976	2,698	108	58	998	114	19,948,850	5,017	5,494
Dist. 9	2,903	1,499	45	31	1,128	200	7,184,154	2,475	3,483
Dist. 10	1,041	527	97	205	189	23	4,679,568	4,495	1,270
Utah	243	117	0	23	102	1	1,382,830	5,691	318
Virginia	8	0	0	8	0	0	39,584	4,948	11
Washington	5	0	0	0	5	0	30,652	6,150	4
West Virginia	884	78	0	686	94	26	2,161,149	2,445	806
Wyoming	1,074	483	2	55	526	8	5,408,834	5,036	990
Total 1960	**46,751**	**21,186**	**1,306**	**3,952**	**17,574**	**2,733**	**190,702,672**	**4,079**	***51,764**
Total 1959	**51,764**	**25,800**	**1,255**	**3,774**	**19,265**	**1,670**	**209,231,416**	**4,092**	.....
Total 1958	**50,039**	**24,578**	**1,125**	**3,678**	**19,043**	**1,615**	**198,224,092**	**4,019**	.....
Total 1957	**55,024**	**28,012**	**688**	**3,932**	**20,983**	**1,409**	**223,087,055**	**4,122**	.....
Total 1956	**58,160**	**30,730**	**428**	**4,115**	**21,838**	**1,049**	**233,902,000**	**4,022**	.....

*Incl. Maryland 1 well.

NOTE: Canada completion data for 1960 appeared in The Oil and Gas Journal, January 23, 1961, pp. 148, 151.

Completions in U. S.–successes, failures–and by months

Wildcat Completions

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Oil	78	74	63	51	72	79	70	76	70	90	66	64
Cond.	12	3	7	10	9	9	12	9	7	9	9	16
Gas	27	25	18	24	32	25	33	29	37	22	24	40
Dry	834	564	676	563	614	840	725	800	610	729	616	763
Total	951	666	764	648	727	953	840	914	724	850	715	883

Development Completions

Oil	1,893	1,319	1,614	1,352	1,566	1,882	1,643	1,905	1,557	1,669	1,666	2,267
Cond.	149	68	111	89	86	105	88	118	100	107	94	79
Gas	320	268	245	216	210	247	373	358	324	341	338	376
Dry	776	627	696	640	669	887	782	913	796	769	761	924
Service	134	114	76	98	84	106	415	506	413	242	264	281
Total	3,272	2,396	2,742	2,395	2,615	3,227	3,301	3,800	3,190	3,128	3,123	3,927

Total Completions

Oil	1,971	1,393	1,677	1,403	1,638	1,961	1,713	1,981	1,627	1,759	1,732	2,331
Cond.	161	71	118	99	95	114	100	127	107	116	103	95
Gas	347	293	263	240	242	272	406	387	361	363	362	416
Dry	1,610	1,191	1,372	1,203	1,283	1,727	1,507	1,713	1,406	1,498	1,377	1,687
Service	134	114	76	98	84	106	415	506	413	242	264	281
Total	4,223	3,062	3,506	3,043	3,342	4,180	4,141	4,714	3,914	3,978	3,838	4,810

Footage (1,000 ft.)

Wildcat	4,356	2,990	3,538	3,095	3,461	4,406	3,822	4,313	3,165	3,795	3,286	4,103
Development	14,007	9,786	12,427	10,574	11,034	13,605	11,797	14,366	11,227	11,575	11,451	14,523
Total	18,363	12,776	15,965	13,669	14,495	18,011	15,619	18,679	14,392	15,370	14,737	18,626

tinued to give Powder River basin big new oil reservoirs. Important new development in these zones were reported in Crook, Weston, and Campbell counties in the northeastern part of the state.

In Williston. Williston's one and only big strike of the year was Tule Creek in Roosevelt County, northeastern Montana. This Devonian discovery is the best of its type yet in the basin. A flurry of leasing excitement swept over a large Montana area. The first offset to the Murphy Corp. discovery was a failure, but at the first of this year activity was brisk to the west and north of the strike.

In Texas. Far West Texas' Delaware basin had its best exploratory year to date with some of the country's most important oil and gas finds. The state's deepest production was established at Atlantic Refining Co. 1 Kelly in Pecos County below 16,680 ft. in Montoya Ordovician. Other deep production was established in Pecos County at Mobil 1 Moore, the basin's first Pennsylvanian producer on the Texas side. In New Mexico, big new Devonian and Pennsylvanian reserves were tapped on the north side of the basin. The Abo trend continued its fast development in New Mexico and at year's end was threatening to move into Texas.

In Southwest Texas deep Edwards exploration spread that trend farther northeast. Wilcox discoveries, nothing new to the area, were widespread as in past years, moving farther coastward than ever before.

In Oklahoma. Oklahoma's Kingfisher County was

Deepest wells outside U. S.

BARBADOS: Gulf-Kerr McGee 1 Lewis, Scotland District. 1959. TD 15,077 ft. Dry.

VENEZUELA: Creole 2 Alturitas, Zulia. 1953. TD 17,173 ft. Suspended.

FRANCE: Lacq field. TD 15,100 ft.

BOLIVIA: Gulf 1 Yoay, Parapeti Block. 1959. TD 15,257 ft. Dry.

COLOMBIA: Ecopetrol 4 Lisama, Middle Magdalena Valley. 1959. TD 15,556 ft. Oil show. Dry.

SPAIN: Valdebro 1 Monesma, Huesca. 1960. TD 15,584 ft. Gas shows.

BAHAMA ISLANDS: Gulf-Bahama California Oil 1 Cay Sal, Bahamas Banks. 1959. TD 18,906 ft. Dry.

VENEZUELA: Deepest production. Richmond 36-E-2, Zulia. 1958. TD 16,237 ft. Producer.

The first 15,000-ft. well drilled outside the U. S. was Shell 2-A Curacao in Zulia, Venezuela, 1931. Total depth was 15,106 ft. Well was dry.

How well footage broke down, by states

	WILDCATS				FIELD WELLS				
	Oil	Cond.	Gas	Dry	Oil	Cond.	Gas	Dry	Service
Alabama	.....	.....	.....	34,884	413,857	.....	.....	.....	.....
Alaska	11,315	.....	14,019	50,610	122,500	.....	17,154	11,774	3,000
Arizona	6,212	.....	.....	57,863	11,182	.....	1,140	9,760	.....
Arkansas	68,655	11,365	40,590	442,675	855,125	11,509	136,529	633,645	12,486
California	109,997	.....	166,687	1,470,805	4,349,638	8,850	468,046	808,987	64,414
Colorado	113,552	21,268	139,585	1,480,786	478,848	35,608	487,293	718,255	.....
Florida	.....	.....	.....	60,332	.....	.....	.....	.....	.....
Georgia	.....	.....	.....	4,551	.....	.....	.....	.....	.....
Idaho	.....	.....	.....	1,182	.....	.....	.....	.....	.....
Illinois	109,196	.....	1,371	812,337	1,731,734	.....	10,558	1,231,284	926,344
Indiana	30,210	.....	6,666	410,992	512,669	.....	5,280	470,057	22,644
Iowa	.....	.....	.....	4,277	.....	.....	.....	.....	.....
Kansas	560,512	.....	178,729	3,192,552	4,856,792	5,402	551,602	2,681,850	416,432
Kentucky	52,940	.....	21,995	237,916	740,151	.....	694,904	747,664	418,869
Louisiana	299,650	235,514	144,103	3,990,799	11,650,495	3,893,567	1,291,048	7,139,718	30,740
North	137,083	10,508	94,255	1,119,827	1,664,904	9,418	814,598	1,515,060	2,824
South	162,567	159,808	49,848	2,493,253	7,356,139	3,031,677	385,530	4,405,007	24,351
Offshore	.....	65,198	.....	377,719	2,629,452	852,472	90,920	1,219,651	3,565
Michigan	35,864	.....	15,781	862,382	1,225,714	.....	71,974	688,379	154,125
Mississippi	285,232	14,000	18,118	2,228,709	2,892,705	299,344	74,909	1,009,293	9,670
Missouri	6,938	.....	.....	40,099	.....	.....	.....	.....	.....
Montana	59,223	.....	10,805	634,595	725,415	.....	10,780	222,993	1,603
Nebraska	207,636	.....	.....	1,880,542	1,237,259	.....	10,419	1,527,930	10,054
Nevada	.....	.....	.....	11,762	.....	.....	.....	.....	.....
New Mexico	188,831	69,701	25,010	953,584	4,795,085	298,414	2,003,779	860,214	31,366
West	38,507	.....	7,331	212,596	798,306	208,873	1,917,463	114,041	11,037
East	150,324	69,701	17,679	740,988	3,996,779	89,541	86,316	746,173	20,329
New York	.....	.....	42,586	109,119	170,340	.....	40,005	36,986	110,132
North Carolina	.....	.....	.....	4,896	.....	.....	.....	.....	.....
North Dakota	67,609	.....	.....	439,374	986,971	11,902	.....	291,473	9,422
Ohio	10,790	.....	41,743	149,007	1,096,132	.....	714,547	535,175	216,456
Oklahoma	836,653	144,716	381,133	2,230,336	7,005,565	441,314	2,128,713	3,480,760	782,339
Oregon	.....	.....	.....	40,206	.....	.....	.....	.....	.....
Pennsylvania	.....	.....	34,164	84,980	428,747	.....	1,105,664	376,516	386,879
South Dakota	.....	.....	.....	43,885	59,925	.....	.....	34,371	.....
Tennessee	5,503	.....	1,555	70,685	1,019	.....	.....	200	.....
Texas	1,104,945	563,350	312,757	12,469,315	30,004,480	6,356,934	2,965,637	11,771,520	943,860
Dist. 1	39,705	8,003	14,604	1,095,997	1,137,735	153,737	145,894	412,995	15,107
Dist. 2	43,768	111,927	20,991	1,133,393	1,183,088	928,062	592,577	1,070,827	4,917
Dist. 3	122,023	134,041	21,512	1,736,762	2,379,571	1,350,123	214,627	2,175,513	8,359
Dist. 4	46,119	145,919	77,800	1,465,042	1,184,553	1,171,604	556,738	1,283,476	28,637
East	67,062	71,966	.....	1,299,176	2,860,772	632,616	36,366	1,080,766	20,086
Dist. 7-B	186,945	18,703	90,406	1,651,405	2,657,137	100,556	274,412	1,329,474	86,632
West	377,293	37,778	60,668	2,392,991	13,389,183	983,652	263,530	2,104,034	339,721
Dist. 9	204,320	16,896	3,890	1,306,864	3,175,981	262,273	165,585	1,653,319	395,026
Dist. 10	17,710	18,117	22,886	387,685	2,036,460	774,311	715,908	661,116	45,375
Utah	40,471	.....	58,998	441,311	646,856	.....	82,367	106,784	6,043
Virginia	.....	.....	.....	.....	.....	.....	39,584	.....	.....
Washington	.....	.....	.....	30,652	.....	.....	.....	.....	.....
West Virginia	.....	.....	25,719	52,247	150,134	.....	1,665,180	203,177	64,692
Wyoming	184,403	18,899	52,533	2,089,606	2,224,339	.....	275,270	538,141	25,643
Total	4,396,337	1,078,813	1,734,647	37,119,853	79,373,677	11,362,844	14,852,382	36,136,906	4,647,213

the country's busiest single drilling arena. Nearly 80 active locations are currently being drilled in this bustling oil and gas boom area. Success ratio runs in the 90's. Prolific, multiple-zone completions highlight the rapid development of Mississippian and Pennsylvanian reservoirs.

Southeastern Oklahoma's Arkoma basin is emerging as a big new source of gas. Last year's exploration set the stage for what promises to be important development in 1961.

In Nebraska. First Cambrian and basal Pennsylvanian production across the northern Kansas border in Redwillow County made the Kaneb basin a bright drilling stage in 1960. Sleepy Hollow field is one of the fastest-growing new areas in the region, accounting for most of Nebraska's new work and interest. About 30% of the state's completions were in this section of the state. Dundy County in the far southwest corner of the state also got into the act late in the year.

On the coast. Natural-gas discoveries both offshore and onshore overshadowed any new oil found in California during 1960.

Several important gas discoveries were made during the year with the most prominent probably being three finds made in the tidelands off Santa Barbara County. All three are tight-hole operations, but it has been confirmed that some gas has been found on all three tracts.

The discoveries are on Blocks A, C, and D, three

1960 completions—wildcats . . . and field wells

	Total	Crude	Cond.	Gas	Dry	Footage	Total	Oil	Cond.	Gas	Dry	Service	Footage
Alabama	7	0	0	0	7	34,884	38	38	0	0	0	0	413,857
Alaska	8	1	0	1	6	75,944	15	11	0	2	1	1	154,428
Arizona	23	1	0	0	22	64,075	12	2	0	1	9	0	22,082
Arkansas	145	17	1	9	118	563,285	470	275	1	27	161	6	1,649,294
California	302	16	0	27	259	1,747,489	1,407	1,144	1	87	160	15	5,699,935
Colorado	358	21	3	23	311	1,755,191	348	98	6	93	151	0	1,720,004
Florida	5	0	0	0	5	60,332	0	0	0	0	0	0	0
Georgia	1	0	0	0	1	4,551	0	0	0	0	0	0	0
Idaho	1	0	0	0	1	1,182	0	0	0	0	0	0	0
Illinois	502	48	0	2	452	922,904	1,871	728	0	6	603	534	3,899,920
Indiana	366	26	0	6	334	447,868	703	319	0	6	365	13	1,010,650
Iowa	4	0	0	0	4	4,277	0	0	0	0	0	0	0
Kansas	1,056	147	0	42	867	3,931,793	3,232	1,893	1	158	951	229	8,512,078
Kentucky	223	42	0	14	167	312,851	1,957	726	0	250	555	426	2,601,588
Louisiana	552	40	18	18	476	4,670,066	3,155	1,645	317	264	919	10	24,005,568
North	268	26	1	14	227	1,361,673	1,184	595	1	216	371	1	4,006,804
South	250	14	12	4	220	2,865,476	1,515	785	245	40	437	8	15,202,704
Offshore	34	0	5	0	29	442,917	456	265	71	8	111	1	4,796,060
Michigan	246	9	0	4	233	914,027	651	348	0	22	195	86	2,140,192
Mississippi	267	29	1	2	235	2,546,059	428	279	29	7	112	1	4,285,921
Missouri	29	4	0	0	25	47,037	0	0	0	0	0	0	0
Montana	168	10	0	4	154	704,623	185	122	0	4	58	1	960,791
Nebraska	392	36	0	0	356	2,088,178	504	243	0	2	257	2	2,785,662
Nevada	3	0	0	0	3	11,762	0	0	0	0	0	0	0
New Mexico	250	30	5	3	212	1,237,126	1,600	984	41	371	189	15	7,988,858
West	70	8	0	1	61	258,434	615	189	32	350	35	9	3,049,720
East	180	22	5	2	151	978,692	985	795	9	21	154	6	4,939,138
New York	44	0	0	13	31	151,705	256	126	0	15	29	86	357,463
North Carolina	3	0	0	0	3	4,896	0	0	0	0	0	0	0
North Dakota	82	9	0	0	73	506,983	201	150	1	0	49	1	1,299,768
Ohio	55	3	0	11	41	201,540	1,044	451	0	249	263	81	2,562,310
Oklahoma	700	130	18	65	487	3,592,838	4,102	2,154	54	369	985	540	13,838,691
Oregon	11	0	0	0	11	40,206	0	0	0	0	0	0	0
Pennsylvania	20	0	0	5	15	119,144	840	256	0	264	76	244	2,297,806
South Dakota	11	0	0	0	11	43,885	11	7	0	0	4	0	94,296
Tennessee	88	7	0	2	79	77,743	4	3	0	0	1	0	1,219
Texas	3,166	190	64	64	2,848	14,450,367	12,415	7,690	743	668	2,907	407	52,042,431
Dist. 1	385	7	1	5	372	1,158,309	741	526	18	30	157	10	1,865,468
Dist. 2	184	6	11	5	162	1,310,079	572	169	109	121	172	1	3,779,471
Dist. 3	218	11	13	2	192	2,014,338	945	447	131	42	324	1	6,128,193
Dist. 4	302	10	17	13	262	1,734,880	772	264	135	108	254	11	4,225,008
East	273	8	8	0	257	1,438,204	1,038	710	84	6	228	10	4,630,606
Dist. 7-B	631	53	4	26	548	1,947,459	1,600	945	26	80	512	37	4,448,211
West	632	52	6	9	565	2,868,730	3,344	2,646	102	49	433	114	17,080,120
Dist. 9	484	41	2	1	440	1,531,970	2,419	1,458	43	30	688	200	5,652,184
Dist. 10	57	2	2	3	50	446,398	984	525	95	202	139	23	4,233,170
Utah	96	6	0	9	81	540,780	147	111	0	14	21	1	842,050
Virginia	0	0	0	0	0	0	8	0	0	8	0	0	39,584
Washington	5	0	0	0	5	30,652	0	0	0	0	0	0	0
West Virginia	11	0	0	4	7	77,966	873	78	0	682	87	26	2,083,183
Wyoming	435	31	2	8	394	2,345,441	639	452	0	47	132	8	3,963,393
Total 1960	**9,635**	**853**	**112**	**336**	**8,334**	**44,329,650**	**37,116**	**20,333**	**1,194**	**3,616**	**9,240**	**2,733**	**146,373,022**
Total 1959	10,073	873	113	340	8,747	48,322,611	41,691	24,927	1,142	3,434	10,518	1,670	160,908,805

of the five 3,840-acre parcels leased by the state in mid-1958.

The tidelands off Santa Barbara are expected to remain one of the state's top wildcatting areas during the coming year as new leases in the area are granted. In fact, the first leases offered off California in 18 months will be awarded next month for a tract off Santa Barbara.

While the offshore play was turning up three gas discoveries, most of the state's gas wildcatting was centered in the continuing gas play in the Sacramento Valley and the northern portion of the San Joaquin Valley.

Most of the state's 29 field or pool gas discoveries during 1960 were made in the Sacramento and San Joaquin play. Many of the fields in the two valleys are small by Mid-Continent standards, but are profitable operations due to the big demand for gas in California, (OGJ, Dec. 19, p. 74). Much of the gas brings a price of 30 cents per M.c.f.

The town-lot drilling play in west Los Angeles resulted in the discovery of Las Cienegas field last summer. The discovery was made on a block of about 7,000 acres held by Union Oil Co. and Richfield Oil Corp. The discovery well flowed at a rate of 1,200 bbl. daily from 5,060-5,330 ft. Six additional wells have been completed on the lease.

There were 13 field or pool oil discoveries during the year. Other than the Las Cienegas discovery, the only oil finds of note were two new-pool discoveries: PML 28-14 pool in Belgian Anticline field and the Marlow-Burns pool in Inglewood field.

Drillers set seven new hole-depth records

State, area—	County, well, and location—	Result	Last formation tested	Year comp.	TD
West Texas	Pecos, Phillips 1-EE Univ., Delaware basin	Dry	Montoya	1958	25,340
Oklahoma	Beckham, Shell 5 Rumberger, Elk City field	Dry	Morrow	1959	24,002
Louisiana, S.	Plaquemines, Richardson & Bass 1 LLE-Humble "L", 35-19s-27e	Oil	Miocene	1956	22,570
California	Kern, Ohio 72-A KCL-A, Paloma field	Dry	Miocene	1954	21,482
Texas (4)	**Webb, H. L. Hunt 1 Walker, South Texas**	**Dry**	**Glen Rose**	**1960**	**20,603**
Wyoming	Sublette, Superior 1 Unit, 27-27n-103w	Dry	Dakota	1949	20,521
Mississippi	Stone, Vasen 1 Fee, 9-2s-11w	Dry	Smackover	1953	20,450
Texas (2)	**DeWitt, Shell 1 Carroll, South Texas**	**Dry**	**Edwards**	**1960**	**19,765**
Louisiana, Offshore	**, Hunt 4 OCS-0426, Block 77, Eugene Island**	**Dry**	**Miocene**	**1960**	**19,061**
Texas (3)	Liberty, Humble 1 Robertson-McDonald, Moss Bluff Dome	Dry	Vicksburg?	1957	18,074
Texas, N.	**Grayson, Grande Corp. 1 Harshbarger Unit, R. Alexander Sur. A-19**	**Dry**	**Ordovician?**	**1960**	**18,008**
New Mexico, SE.	Eddy, Shell 1 James Ranch, 36-22s-30e	Cond.	Ellenburger	1958	17,555
Texas (1)	Val Verde, Humble 1 Mills Mineral Trust, 128-I&GN-Blk. 1	Dry	Ellenburger	1957	17,525
Colorado	Rio Blanco, Phillips 1 Mannel, 27-1n-95w	Gas	Weber	1957	17,033
East Texas	Freestone, Humble 1 McWatters, East Texas Syn.	Oil	Smackover	1949	16,347
Texas Panhandle	Wheeler, Max Pray 1 Mills, 37-H&GN-Blk. A-7	Dry		1958	16,156
British Columbia	**, Cal-Standard Fording Mountain, Fording Mountain**	**Dry**		**1960**	**16,100**
Alabama	Clark, Humble 1 Williams, 10-3n-2e	Oil	Jurassic	1952	15,729
Florida	Key West, Gulf St. Lse. 826-Y, Offshore	Dry		1959	15,475
Alberta	, Texaco 8-28 Simonette River, West-Central	Oil	D3 reef	1958	15,283
North Dakota	**McKenzie, Amerada 1 Antelope, Antelope field**	**Oil**	**Sanish**	**1960**	**15,135**
Alaska	Kenai, Union-Ohio 1 Kenai, Kenai Peninsula	Gas	Tertiary	1959	15,047
Louisiana, North	Webster, CVOC-Oliphant 2 Banks, Cotton Valley field	Dry	Salt	1947	14,967
Montana	Carbon, Mountain States-Phillips 1 NP, 33-9s-21e	Dry	Chugwater	1956	13,830
Utah	Grand, Equity & Pacific Western 1 Unit, 33-21s-21e	Dry	Penn.	1949	13,767
New Mexico, NW.	Rio Arriba, Magnolia 1 Jicarilla "A", 18-23n-2w	Gas	Cret.	1955	13,590
New York	Steuben, NY State Natural Gas Co. 1 Olin, Woodhull Twp.	Dry		1959	13,500
West Virginia	Wood, Hope Natural 9634,	Dry		1955	13,331
Kentucky	Martin, United Fuel 1 James, Coldwater Fork	Dry		1959	13,172
Arkansas	Columbia, Hunt 1 McDonald, 1-20s-21w	Dry	Salt	1957	12,925
Oregon	Lane, Sinclair 1 Federal-Mapleton, 12-16s-10w	Dry		1955	12,880
Idaho	Oneida, Phillips et al. 1 Juniper, 10-14s-30e	Dry		1952	12,844
Pennsylvania	Sullivan, California Co. 1 Bennett,	Dry	Siluro-Ord.	1951	12,343
Nevada	White Pine, Continental-Cal-Standard 1 Unit, 32-20n-60e	Dry		1952	11,543
Michigan	Ogemaw, Ohio-Pure 1 Reinhardt, 35-22n-2e	Dry	Cambro-Ord.	1948	11,012
Washington	Snohomish, Stand. of Calif. 1 Alderwood,	Dry	Mid-Eocene	1947	11,002
North Carolina	Dare, Standard (Jersey) 1 Hatteras Light, Cape Hatteras	Dry	Granite	1946	10,054
Illinois	**Fayette, Humble 1 Weaber-Horn Unit, 28-8n-3e**	**Dry**	**Precambrian**	**1960**	**8,613**

. . . and six new producing-depth marks

State, area—	County, well, and location—	Result	Pay zone	Year comp.	Prod. depth
Louisiana, S.	Plaquemines, Richardson & Bass et al. 1-L Humble LL&E, 35-19s-27e	Oil (recompleted at 20,741-745)	Miocene	1956	21,443
California	Kern, Richfield 67-29 Coles Levee, Coles Levee	Cond. (not prod.)	Eocene	1953	17,892
West Texas	**Pecos, Atlantic 1 Kelly, Delaware basin**	**Gas**	**Montoya**	**1960**	**16,680**
Oklahoma	Stephens, British-American 1 Krieger, Knox field	Gas-cond.	Oil Creek	1957	16,546
Texas, N.	**Grayson, Statex 3 McAdams, New Mag field**	**Gas**	**Ordo.**	**1960**	**16,540**
Wyoming	Natrona, Pure 1 Badwater Unit, 35-39n-89w	Gas	U. Cret.	1958	16,472
Texas (3)	Galveston, Pure 1 Houston Farms, Sarah White area	Gas	Frio	1959	16,264
Mississippi	Jasper, Gulf 1 Z. B. Soso Field Unit, 28-19n-13w	Oil	Cotton Valley	1958	15,256
New Mexico, SE.	Lea, Continental 1-A Bell Lake Unit, 31-23s-34e	Gas	Devonian	1955	15,025
Texas (1)	McMullen, Amerada 1 Lowe Craig, Lowe Ranch field	Gas	Edwards	1956	14,479
Texas (2)	**Lavaca, Mobil 1 Kahanek, Word area**	**Gas-cond.**	**Edwards**	**1960**	**14,278**
North Dakota	Williams, Amerada 1 Peterson-Davidson, Beaver Lodge	Cond.	Ordo.	1958	13,214
Montana	Richland, Sun-Phillips 2 Dynneson, Brorson field	Oil	Ordo.	1955	12,654
Texas, East	Franklin, Tidewater 1 Ramey Unit, New Hope field	Gas-cond.	Smackover	1954	12,341
Canada	Alberta, B.A. A8-4 Berland River, Berland River	Gas	D3	1958	12,179
Florida	Collier, Humble 1 Gulf Coast, Sunniland field	Oil (now abd)	Sunniland	1943	11,626
Alabama	Mobile, Zach Brooks 1 Donovan, Citronelle	Oil	Rodessa	1955	11,414
Louisiana, N.	Webster, Humble 1 Taylor-Duke Unit, Red Rock field	Oil	Smackover	1957	11,300
Texas (10)	Gray, Phillips 1 Troy "A", M-2-86-H&GN	Oil	Ellenb.	1955	11,290
Alaska	Kenai, Richfield 1 Swanson River, Swanson River field	Oil	Hemlock	1957	11,215
Arkansas	**Lafayette, Austral Oil Co. et al. 1 International Paper Co., 34-19s-24w**	**Gas-cond.**	**Smackover**	**1960**	**11,025**
Utah	Uintah, Carter 1 Peterson, 13-1s-1w(USM)	Oil	Wasatch	1952	10,244
Colorado	Moffat, Malco 1 Kowach, 25-6n-90w	Oil	Weber	1957	10,084
New Mexico, NW.	San Juan, Southern Union 9 Barker Creek, 21-32n-14w	Gas	Penn.	1945	9,468
South Dakota	Harding, Shell 1 State "A," 9-21-4e	Oil	Red River	1953	8,690
Pennsylvania	Somerset, Peoples 3 Pa. Tract 75, Kooser pool	Gas	Onondaga	1959	8,472
West Virginia	Tucker, Ohio 1 Kuykendall et al., Dry Fork Dist.	Gas	Oriskany	1946	8,410
Michigan	Bay, Michigan Gulf 1 Bateson, Kawkawlin field	Oil (now abd)	Salina	1946	7,850
Nebraska	Kimball, Gulf 1 Sisson, 18-21n-58w	Oil	Dakota	1951	7,431
Ohio	Medina, Ohio Fuel et al.,	Gas	Ordo.	1959	7,040
Arizona	**Apache, Texaco 1 Navajo, 36-41n-30e**	**Oil**	**Devonian**	**1960**	**6,793**
Nevada	Nye, Shell 1 Unit, Eagle Springs	Oil	Volcanics	1954	6,730
Kansas	Clark, Stanolind 1 Wall, 35-32s-23w	Oil	Viola	1951	6,576
Illinois	**Wayne, Texaco 16 Silverman, 16-3s-7e**	**Oil**	**Devonian**	**1960**	**5,331**
New York	Steuben, Kane 1 Lewis, West Union Twp.	Gas	Oriskany	1942	5,228
Kentucky	Pike, United Carbon 1 Howe,	Gas	Devonian	1932	5,170

Wells in boldface type indicate 1960 record.

Depth of 1960 service wells . . .

	A	B	C	D	E	F
Alaska			1			
Arkansas		6				
California	1	1	6	3	3	1
Illinois	79	282	172	1		
Indiana	5	6	2			
Kansas	117	29	58	23	2	
Kentucky	419	5	2			
Louisiana		3	5	1	1	
North			1			
South		3	3	1	1	
Offshore			1			
Michigan	17	42	20	6	1	
Mississippi						1
Montana		1				
Nebraska				1	1	
New Mexico	7	1	5		2	
West	6	1	2			
East	1		3		2	
New York		86				
North Dakota						1
Ohio	26	2	20	33		
Oklahoma	219	256	55	9	1	
Pennsylvania	28	216				
Texas	114	118	125	37	10	3
Dist. 1	5	2	3			
Dist. 2				1		
Dist. 3						1
Dist. 4		9	1			1
East	5	1	3		1	
Dist. 7-B	11	13	7	2	4	
West	4	17	80	11	1	1
Dist. 9	84	68	21	23	4	
Dist. 10	5	8	10			
Utah					1	
West Virginia		23		1	2	
Wyoming	2		2	3	1	
Total 1960	**1,034**	**1,077**	**473**	**118**	**25**	**6**

MULTIPLE-COMPLETION SCORE

	Dual	Triple	Quadruple	Sextuple
Arkansas	18	4	1	
California	13			
Colorado	4			
Kansas	42	2		
Louisiana	326	49	5	
North	13	4		
South	229	10		
Offshore	84	35	5	
Mississippi	27	4		
Montana	6	1		
New Mexico	89			
West	50			
East	39			
North Dakota	1			
Oklahoma	273	26		
Texas	655	56	4	1
Dist. 1	25	1		
Dist. 2	82	6	1	1
Dist. 3	122	5	1	
Dist. 4	104	15	2	
East	71	7		
Dist. 7-B	15	1		
West	155	17		
Dist. 9	37	2		
Dist. 10	44	2		
Utah	2			
Wyoming	3			
Total U. S. 1960	**1,459**	**142**	**10**	**1**

. . . wildcat condensate

	A	B	C	D	E	F	G	H	I
Arkansas							1		
California						1			
Colorado					6				
Kansas					1				
Louisiana	1				7	40	121	96	52
North						1			
South	1				6	29	89	80	40
Offshore					1	10	32	16	12
Mississippi				2	1	12	10	3	1
New Mexico					32	5	2	2	
West					30	2			
East					2	3	2	2	
North Dakota							1		
Oklahoma				2	21	18	12	1	
Texas		2	15	47	196	265	189	25	4
Dist. 1		1	1		2	6	8		
Dist. 2				1	38	51	16	2	1
Dist. 3			1		10	38	64	16	2
Dist. 4				1	46	58	29	1	
East				10	33	32	7	2	
Dist. 7-B		1	7	16	2				
West			1	11	14	10	63	2	1
Dist. 9			2	4	34	1		2	
Dist. 10			3	4	17	69	2		
Wyoming									
Total 1960	**1**	**2**	**15**	**51**	**264**	**341**	**336**	**127**	**57**

. . . and field condensate

	A	B	C	D	E	F	G	H	I
Arkansas							1		
California									
Colorado					2	1			
Kansas									
Louisiana					2	5	8	3	
North						1			
South					1	4	4	3	
Offshore					1		4		
Mississippi							1		
New Mexico						1	3	1	
West									
East						1	3	1	
North Dakota									
Oklahoma				9	6	2	1		
Texas		2	1	4	14	14	20	6	3
Dist. 1						1			
Dist. 2					3		2	4	2
Dist. 3					1	2	9	1	
Dist. 4				1	4	7	5		
East					3	2	2	1	
Dist. 7-B				3	1				
West		2	1		1		1		1
Dist. 9					1		1		
Dist. 10						2			
Wyoming						1	1		
Total 1960	**....**	**2**	**1**	**4**	**25**	**24**	**30**	**19**	**7**

NOTE: A = 0-1,250 ft.; B = 1,250-2,500 ft.; C = 2,500-3,750 ft.; D = 3,750-5,000 ft.; E = 5,000-7,500 ft.; F = 7,500-10,000 ft.; G = 10,000-12,500 ft.; H = 12,500-15,000 ft.; I = 15,000 ft.

How 1960 field wells broke down—by depth

	OIL									GAS									DRY								
	A	B	C	D	E	F	G	H	I	A	B	C	D	E	F	G	H	I	A	B	C	D	E	F	G	H	I
Alabama	....	....	3	....	....	....	35	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Alaska	....	....	....	....	....	....	11	....	....	....	....	....	....	1	....	1	....	....	....	....	....	....	....	....	1	....	....
Arizona	....	....	....	....	2	....	....	....	....	1	....	....	....	....	....	....	....	....	8	1	....	....	....	....	....	....	....
Arkansas	3	86	148	17	18	2	1	....	....	....	2	3	6	16	....	....	....	....	1	13	91	29	19	5	3	....	....
California	311	241	160	161	132	62	55	20	2	3	4	13	12	44	10	....	....	1	12	24	27	27	32	22	12	3	1
Colorado	2	4	12	28	51	1	....	....	....	1	6	11	10	53	12	....	....	....	7	5	22	42	74	1	....	....	....
Illinois	56	293	361	8	9	1	....	....	....	2	2	2	....	....	....	....	....	....	130	181	270	13	8	1	....	....	....
Indiana	129	134	56	....	....	....	....	....	....	5	1	....	....	....	....	....	....	....	200	145	20	....	....	....	....	....	....
Kansas	516	362	619	352	44	....	....	....	....	39	14	22	34	49	....	....	....	....	215	107	335	244	50	....	....	....	....
Kentucky	493	206	26	1	....	....	....	....	....	40	61	90	57	2	....	....	....	....	274	225	47	8	1	....	....	....	....
Louisiana	56	319	155	64	197	384	274	144	52	15	117	27	11	19	41	22	9	3	13	101	133	66	104	154	214	94	40
North	55	306	94	44	73	22	1	....	....	14	117	24	9	13	34	5	....	....	10	88	111	49	67	38	7	1	....
South	1	13	61	19	85	270	174	115	47	1	....	3	1	6	6	14	7	2	3	12	21	14	29	94	163	71	30
Offshore	....	....	....	1	39	92	99	29	5	....	....	....	1	....	1	3	2	1	....	1	1	3	8	22	44	22	10
Michigan	2	69	41	236	....	....	....	....	....	1	2	9	10	....	....	....	....	....	5	38	34	117	1	....	....	....	....
Mississippi	....	....	....	15	21	18	210	15	....	....	....	....	2	....	1	....	3	1	....	....	3	12	22	21	46	8	....
Montana	....	9	32	18	11	52	....	....	....	....	....	4	....	....	....	....	....	....	5	8	14	19	9	3	....	....	....
Nebraska	....	2	64	58	119	....	....	....	....	....	....	....	....	2	....	....	....	....	3	....	10	36	208	....	....	....	....
New Mexico	35	102	179	258	314	60	31	5	....	5	33	70	18	203	42	....	....	....	22	38	36	32	26	17	15	3	....
West	12	44	16	19	97	1	....	....	....	4	31	66	14	195	40	....	....	....	9	8	4	5	7	2	....	....	....
East	23	58	163	239	217	59	31	5	....	1	2	4	4	8	2	....	....	....	13	30	32	27	19	15	15	3	....
New York	....	126	....	....	....	....	....	....	....	....	4	11	....	....	....	....	....	....	....	28	1	....	....	....	....	....	....
North Dakota	....	....	14	41	38	52	4	1	....	....	....	....	....	....	....	....	....	....	....	....	12	11	11	12	3	....	....
Ohio	108	42	290	11	....	....	....	....	....	37	37	135	38	2	....	....	....	....	107	34	103	17	2	....	....	....	....
Oklahoma	444	650	362	242	286	143	24	3	....	24	27	42	31	146	86	10	2	1	136	326	184	109	155	63	11	1	....
Pennsylvania	....	256	....	....	....	....	....	....	....	....	....	170	24	70	....	....	....	....	....	46	....	....	30	....	....	....	....
South Dakota	....	....	....	....	....	7	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	4	....	....	....
Tennessee	1	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....
Texas	1,068	1,528	1,719	1,412	1,147	632	151	33	....	8	136	200	95	138	69	20	2	....	406	671	507	441	457	286	116	18	5
Dist. 1	74	294	110	35	12	....	1	....	....	1	5	13	2	2	....	7	....	....	43	49	36	10	6	8	5	....	....
Dist. 2	1	2	7	28	75	25	30	1	....	1	9	26	34	35	14	2	....	....	4	10	22	19	56	51	8	2	....
Dist. 3	42	44	51	85	118	84	22	1	....	....	3	5	11	19	4	....	....	....	26	26	32	27	66	80	55	8	4
Dist. 4	24	38	31	62	86	22	1	....	....	2	12	25	17	28	17	6	1	....	19	35	38	29	84	33	14	2	....
East	147	69	142	153	94	100	4	1	....	....	1	....	1	1	3	....	....	....	33	24	27	46	52	37	8	1	....
Dist. 7-B	209	244	152	267	73	....	....	....	....	4	11	39	19	7	....	....	....	....	131	130	84	134	33	....	....	....	....
West	58	287	655	647	547	332	90	30	....	....	2	18	8	11	4	5	1	....	22	65	85	91	90	50	24	5	1
Dist. 9	513	514	173	135	118	5	....	....	....	....	3	1	....	26	....	....	....	....	128	307	126	75	50	1	1	....	....
Dist. 10	....	36	398	....	24	64	3	....	....	....	90	73	3	9	27	....	....	....	....	25	57	10	20	26	1	....	....
Utah	....	....	....	....	110	1	....	....	....	1	....	....	1	11	1	....	....	....	2	1	3	....	13	2	....	....	....
Virginia	....	....	....	....	....	....	....	....	....	....	....	....	8	....	....	....	....	....	....	....	....	....	....	....	....	....	....
West Virginia	6	67	5	....	....	....	....	....	....	11	452	118	90	11	....	....	....	....	1	61	17	7	1	....	....	....	....
Wyoming	34	19	55	122	212	9	1	....	....	....	2	7	8	19	10	1	....	....	33	9	19	16	49	3	2	....	1
Total 1960	**3,264**	**4,517**	**4,301**	**3,044**	**2,711**	**1,424**	**797**	**221**	**54**	**193**	**900**	**934**	**455**	**786**	**272**	**54**	**16**	**6**	**1,581**	**2,062**	**1,888**	**1,246**	**1,272**	**594**	**423**	**127**	**47**

NOTE: A = 0-1,250 ft.; B = 1,250-2,500 ft.; C = 2,500-3,750 ft.; D = 3,750-5,000 ft.; E = 5,000-7,500 ft.; F = 7,500-10,000 ft.; G = 10,000-12,500 ft.; H = 12,500-15,000 ft.; I = 15,000 ft.

How 1960 wildcats broke down—by depth

	OIL									GAS									DRY								
	A	B	C	D	E	F	G	H	I	A	B	C	D	E	F	G	H	I	A	B	C	D	E	F	G	H	I
Alabama																			2		2	1			2		
Alaska							1										1				2			2	1	1	
Arizona					1														9	5	1	1	6				
Arkansas		1	12	2	2						1	1	2	5					9	11	55	24	9	7	3		
California	1	1	2	2	1	7	2			1		4	4	7	11				11	32	34	35	91	35	14	5	2
Colorado		1	3	5	10	1	1					6	2	7	8				34	11	20	66	156	20	3	1	
Florida																							1	1	1	2	
Georgia																						1					
Idaho																			1								
Illinois	10	14	22		2					2									150	144	153	3	2				
Indiana	20	4	2							4	1	1							201	119	14						
Iowa																			3	1							
Kansas		16	55	60	16						14	2	1	15					7	116	348	308	88				
Kentucky	26	10	6							7	5	1		1					78	75	10	2	1		1		
Louisiana		4	4	4	8	7	9	3	1	3		2		2	3	6	1	1	5	31	44	36	88	74	104	67	27
North		4	4	4	8	5	1			3		2		1	3	5			5	30	41	36	82	27	5	1	
South						2	8	3	1					1		1	1	1		1	3		6	45	90	53	22
Offshore																								2	9	13	5
Michigan		1	1	7								2		2					3	40	68	94	28				
Mississippi			1	5	2	1	16	3	1				1				1			1	3	18	63	13	102	34	1
Missouri			4																	2	23						
Montana			2	3	2	2	1				2	1	1						9	24	33	36	45	5	2		
Nebraska			4	6	26														2	5	36	95	218				
Nevada																						3					
New Mexico	3	5	4	2	3	7	3	3						2		1			42	32	31	26	42	19	11	9	
West		1	3		3	1								1					16	12	7	8	13	5			
East	3	4	1	2		6	3	3						1		1			26	20	24	18	29	14	11	9	
New York											5	6		2					2	3	14	6	5	1			
North Carolina																				3							
North Dakota			1	3		3	1		1											2	19	16	16	11	6	3	
Ohio			3							1	1	4	3	2						6	16	15	4				
Oklahoma	1	9	17	15	42	34	9	3		2	6	6	9	25	14	1	2		59	75	93	71	106	60	16	5	2
Oregon																			3		2	3	2		1		
Pennsylvania														3	2							2	13				
South Dakota																			3	2	2		2	2			
Tennessee	5	2								2									62	17							
Texas	5	12	29	41	57	21	17	8		8	6	11	20	10	3	3	1	2	408	550	428	425	579	283	134	29	12
Dist. 1			2		4	1				1	2	1		1					107	97	64	38	45	10	8	2	1
Dist. 2				1	2	2	1				1		2	2					2	5	12	20	50	51	21		1
Dist. 3						3	6	2				1						1	1		10	4	28	84	49	11	5
Dist. 4	1	1	1	2	3	1						3	3	4	1	2			22	24	42	28	71	45	23	6	1
East				2	1	1	3	1											20	17	30	66	83	30	8	3	
Dist. 7-B	3	10	18	14	8					4	3	4	12	3					74	167	137	104	66				
West	1	1	3	8	17	11	6	5		3		1	1		2	1		1	91	92	70	98	151	38	18	5	2
Dist. 9			5	14	22							1							91	148	60	62	72	5			2
Dist. 10						2							2				1				3	5	13	20	7	2	
Utah			1		2	3							3	3	2	1			5	6	9	11	34	10	6		
Washington																			1			2		1	1		
West Virginia														4									6			1	
Wyoming	2	2	1	6	11	6	3					2	1	4				1	41	38	50	28	152	67	14	4	
Total 1960	**73**	**82**	**174**	**161**	**185**	**92**	**63**	**20**	**3**	**30**	**41**	**49**	**57**	**94**	**43**	**12**	**6**	**4**	**1,150**	**1,351**	**1,510**	**1,328**	**1,757**	**611**	**422**	**161**	**44**

NOTE: A = 0-1,250 ft.; B = 1,250-2,500 ft.; C = 2,500-3,750 ft.; D = 3,750-5,000 ft.; E = 5,000-7,500 ft.; F = 7,500-10,000 ft.; G = 10,000-12,500 ft.; H = 12,500-15,000 ft.; I = 15,000 ft.

2,000 more cable-tool wells drilled last year than in '59

A NOTABLE INCREASE in cable-tool drilling was reported in the United States in 1960. Shallow drilling in the country netted 12,000 completions, up 2,730 over the previous year.

Last year's big jump in cable-tool drilling was due mostly to better records on eastern Kansas and northeastern Oklahoma stripper areas. Oklahoma's 1,780 wells completed led the nation, while usual first-place Kentucky fell to second place with 1,688, due to the drop in South-Central Kentucky drilling. Texas came in third with 1,351 completions, most of them recorded in the northern and western counties. A big jump was noted in Kansas at 1,250 while Ohio and Illinois reported 1,051 and 1,199, respectively. Appalachian states recorded 880 for West Virginia, 800 for Pennsylvania, and 300 for New York.

How 1960's wells were drilled

	Cable	Rotary	Total wells
Alabama	0	45	45
Alaska	0	23	23
Arizona	6	29	35
Arkansas	14	601	615
California	5	1,704	1,709
Colorado	26	680	706
Florida	0	5	5
Georgia	0	1	1
Idaho	1	0	1
Illinois	1,199	1,174	2,373
Indiana	781	288	1,069
Iowa	4	0	4
Kansas	1,250	3,038	4,288
Kentucky	1,688	492	2,180
Louisiana	0	3,707	3,707
Michigan	314	583	897
Mississippi	0	695	695
Missouri	29	0	29
Montana	41	312	353
Nebraska	0	896	896
Nevada	0	3	3
New Mexico	335	1,515	1,850
New York	300	0	300
North Carolina	3	0	3
North Dakota	0	283	283
Ohio	1,051	48	1,099
Oklahoma	1,780	3,022	4,802
Oregon	0	11	11
Pennsylvania	800	60	860
South Dakota	0	22	22
Tennessee	92	0	92
Texas	1,351	14,230	15,581
Dist. 1	193	933	1,126
Dist. 2	0	756	756
Dist. 3	0	1,163	1,163
Dist. 4	81	993	1,074
East	41	1,270	1,311
Dist. 7-B	209	2,022	2,231
West	515	3,461	3,976
Dist. 9	312	2,591	2,903
Dist. 10	0	1,041	1,041
Utah	0	243	243
Virginia	8	0	8
Washington	0	5	5
West Virginia	880	4	884
Wyoming	42	1,032	1,074
Total 1960	12,000	34,751	46,751
Total 1959	9,270	42,494	51,764
Total 1958	8,617	41,422	50,039

17,614 wells to go on pump in 1961

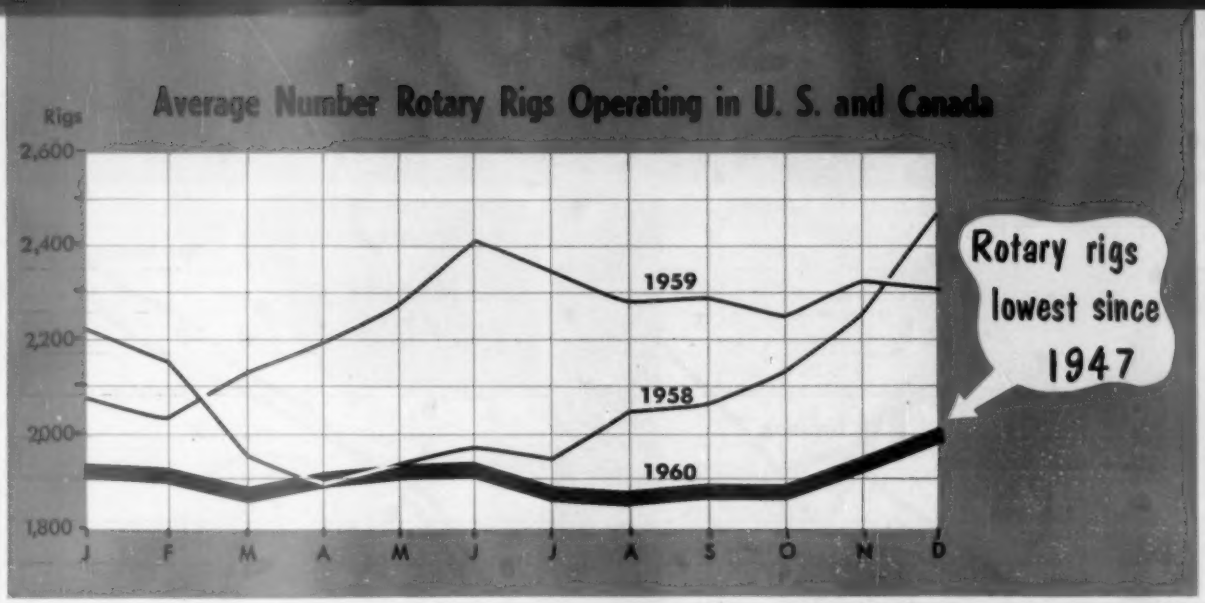
WILDCAT WELLS make up a bigger percentage of the total to be drilled in 1961. And the success ratio for wildcats is lower than that for development wells.

This in a nutshell is the reason that the number of wells to go on the pump this year is 5½% less than the number that was forecast this time last year.

Our drilling survey shows little change in total number of wells to be drilled in 1961, but development wells are off, with the wildcats making up the difference.

There is more and more emphasis on gas these days, too. Most operators would be glad to trade a couple of prorated oil wells for a good gas well any day, and drilling money is probably being channeled into gas areas rather than into development drilling in oil fields.

Alabama	37
Alaska	5
Arizona	10
Arkansas	250
California	1,000
Colorado	210
Florida	—
Illinois	780
Indiana	310
Kansas	1,950
Kentucky	721
Louisiana	995
Michigan	250
Mississippi	250
Montana	116
Nebraska	300
New Mexico	570
New York	225
North Dakota	110
Ohio	470
Oklahoma	2,318
Pennsylvania	190
South Dakota	2
Texas	
Dist. 1	370
Dist. 2	68
Dist. 3	194
Dist. 4	180
Dist. 5 & 6	470
Dist. 7-B	800
Dist. 7-C & 8	1,850
Dist. 9	1,410
Dist. 10	620
Texas total	5,962
Utah	38
West Virginia	65
Wyoming	460
Misc.	20
Total	17,614



Rotary-rig activity averaged only 1,915

CURTAILMENT OF DRILLING during 1960 made further heavy inroads on the number of rotary rigs operating in the United States and Canada.

Top number reported running at any one time during the year was the 2,077 rigs during the first week. This number was more than 120 under the number running at the start of the previous year, and nearly 360 below the peak for that year.

The year's average was down to 1,915, the lowest for any year since 1947. It lacked only 69 rigs of hitting that year's average.

Low mark for the year was reached late in August when 1,828 rigs were reported active. This number was nearly 170 under 1959's low. At no time during the year did the number come up anywhere near that of its corresponding week of the previous year. Weekly decreases ranged from around 200 to more than 500 rigs most of the time.

Cuts in the number of active rotaries were general over both the United States and Canada. Among the more important oil producing states, only Michigan had an increase. There was a perceptible pickup in drilling of Louisiana's offshore areas, but declines elsewhere in the state more than offset this gain.

Rotary-rig activity by years

(United States and Canada)

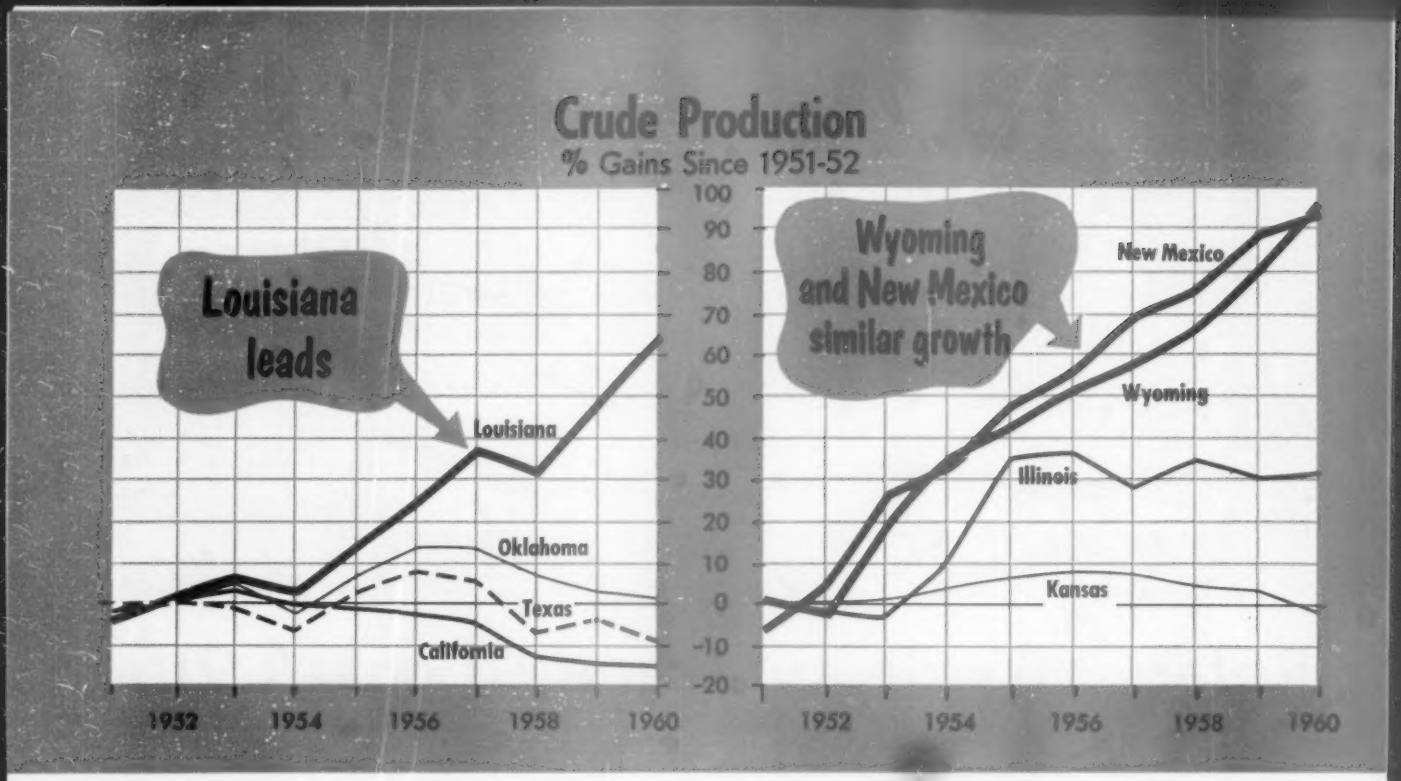
Year	No. rigs* Jan. 1	No. rigs* Dec. 31	Peak No.	Low No.	Avg. No.
1960	2,077	2,016	2,077	1,828	1,915
1959	2,198	2,136	2,436	1,996	2,245
1958	2,373	2,364	2,565	1,870	2,090
1957	2,617	2,518	2,842	2,355	2,624
1956	3,023	2,759	3,132	2,619	2,843
1955	2,683	3,084	†3,338	2,574	2,856

*Based on Hughes Tool Co. weekly average figures. †All-time peak number.

Rotary-rig activity by states

State—	No. rigs* Jan. 1	No. rigs* Dec. 31	Peak No.	Low No.	Average No. 1960	Average No. 1959
Alabama	5	7	7	1	4	7
Arkansas	14	10	17	9	12	14
California	78	84	100	59	80	93
Colorado	39	24	59	18	35	43
Ill.-Ind.-Ky.	51	47	69	23	50	51
Kansas	123	123	138	77	112	138
Louisiana	286	280	304	262	287	332
North	30	38	46	22	35	37
South onshore	205	191	225	168	197	246
Offshore	51	51	73	47	55	49
Michigan	37	28	48	13	35	26
Mississippi	68	59	80	45	61	67
Montana	18	31	32	8	20	22
Nebraska	24	23	32	16	23	25
New Mexico	114	108	127	80	106	113
North Dakota	25	15	25	8	16	30
Oklahoma	188	194	212	150	179	226
Pennsylvania-Eastern†	22	26	27	13	21	20
Texas	662	666	666	539	604	750
South	183	194	201	147	175	186
North-Pan.-East	160	172	174	109	147	166
West Central	218	174	218	144	176	251
West	101	126	132	82	106	147
Utah	27	32	36	23	29	32
Wyoming	64	68	76	50	63	74
Others‡	8	20	22	2	13	11
Total U. S.	1,853	1,845	§1,895	§1,617	1,750	2,074
Canada	224	171	259	87	165	171
Total	2,077	2,016	§2,077	§1,828	1,915	2,245

*Based on Hughes Tool Co. weekly figures. †Includes New York, West Virginia, Maryland, and Ohio. ‡Alaska, Arizona, Florida, Iowa, Georgia, Missouri, Nevada, Oregon, South Dakota, Tennessee, Washington, and Wisconsin. §From U. S. and Canada weekly average totals.



Production-demand ratio hits new low

Domestic producers supplied only 71.5% of total demand

CRUDE PRODUCTION in 1960 supplied the smallest portion of total demand on record. Based on Bureau of Mines' figures for the first 10 months and weekly data for November and December, crude production for the year represented only 71.5% of total demand for the year.

The chart on the next page gives a picture of this relationship between crude production and demand since the end of World War II. There has been a definite downward trend for the entire period with the ratio well below 75% for the past 3 years.

A barrel of marketed petroleum products may come from one or more of four supply sources. It may be made directly from current crude production. It may be imported or made from foreign crude. It may be produced at some natural-gasoline or cycling plant. Or, it may be supplied through inventory reduction.

. . . A large portion of the crude slowdown in the postwar period was due to increased imports, but the import problem has been partially solved through quota systems.

. . . Production of gas liquids has increased faster than demand for products. Total demand has gained about 85% since 1946. Gas-liquids production is up 195%.

. . . Crude and product inventories were reduced in 1960. Since part of demand was supplied from storage, there was a cut in total new supply, particularly crude production. The reduction in crude stocks amounted to about 22 million barrels.

Actual crude production for the year averaged 7,032,000 bbl. daily or 22,000 bbl. daily less than in 1959. The table at the top of the next page also shows that production for the year was less than it was back in 1956 and 1957, during the Suez crisis.

Louisiana had the largest volumetric gain in production for the year, up 37,600,000 bbl. to 392,000,000 bbl. Others in order of increased volumes were: Wyoming, Michigan, Mississippi, North Dakota, New Mexico, and Arkansas.

The big reduction for the year was in Texas where the Railroad Commission made sharp cuts in the number of producing days to bring crude supply in line with demand. Reduction for the year amounted to almost 52,000,000 bbl. for 104 producing days. Other significant reductions were made in Kansas, Oklahoma, and Kentucky.

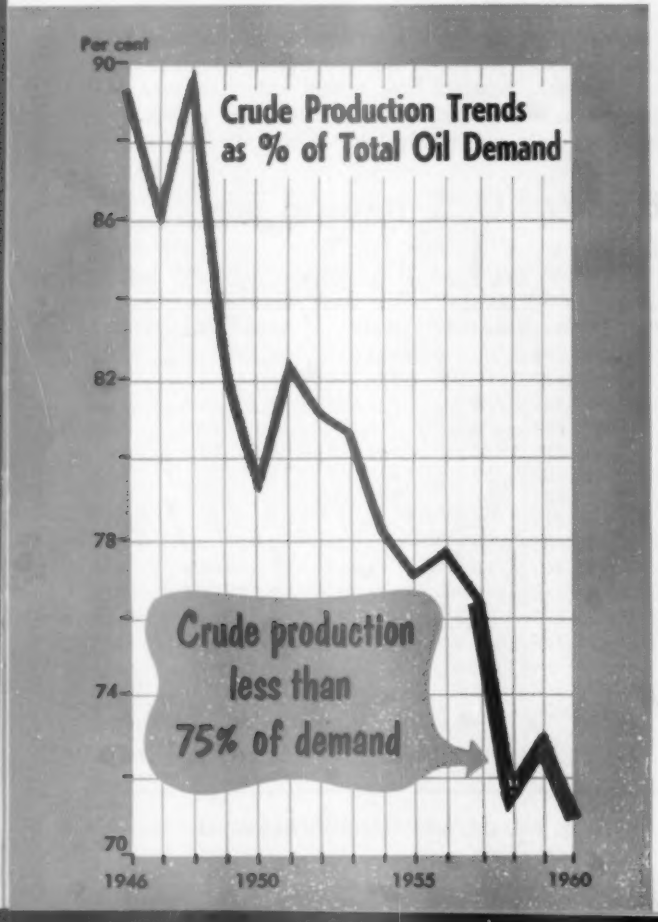
Growth patterns for important producing states are pictured in the charts at the top of this page. Lines show percentage gains since 1951-52. The left chart compares records for the four top states. Louisiana leads with current production almost 65% above the 1951-52 average. Texas production for 1960 was 8.4% under the base period. California was low man of the group with a reduction of 14.7%.

Other important producing states have been charted on the second graph. New Mexico and Wyoming lead the list with similar growth patterns. Both have gains ranging above 90%. Kansas is the only state currently showing a decrease from the base period.

U. S. production of crude oil and lease condensate

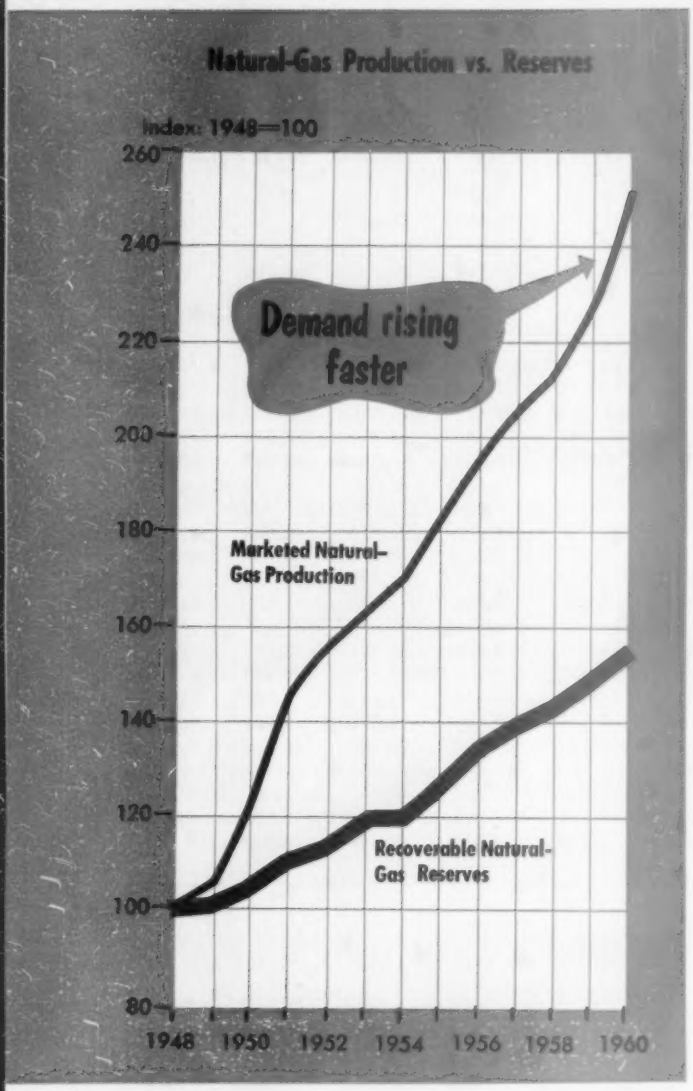
(Thousands of barrels)

	1960 prod. change	1960	1959	1958	1957	1956	1955	1954	Cum. prod.
Alabama	2,303	7,322	5,019	5,887	5,406	3,069	1,411	1,584	36,320
Arkansas	2,410	28,739	26,329	28,700	31,047	29,355	28,369	29,130	1,086,827
California	− 2,480	304,847	307,327	313,672	339,646	350,754	354,812	355,865	12,026,068
Colorado	1,057	47,207	46,150	48,736	54,982	58,516	52,653	46,206	594,415
Florida	− 47	377	424	449	461	479	495	548	6,538
Illinois	997	79,432	78,435	80,275	77,083	82,346	81,423	66,798	2,231,653
Indiana	− 403	11,600	12,003	11,864	12,662	11,513	10,988	11,204	318,618
Kansas	− 6,014	113,500	119,514	119,942	123,614	124,204	121,669	119,317	3,309,193
Kentucky	− 4,845	21,498	26,343	17,509	17,029	17,628	15,518	13,791	416,399
Louisiana	37,591	392,202	354,611	313,891	329,896	299,421	271,010	246,558	5,498,470
Michigan	5,237	15,675	10,438	9,308	10,169	10,740	11,266	12,028	441,335
Mississippi	4,753	52,681	47,928	39,512	38,922	40,824	37,741	34,240	684,415
Montana	121	30,200	30,079	27,957	27,172	21,760	15,654	14,195	365,711
Nebraska	819	24,488	23,669	20,373	19,586	16,204	11,203	7,783	140,903
New Mexico	2,732	108,424	105,692	98,515	94,759	87,893	82,958	74,820	1,516,737
New York	− 170	1,811	1,981	1,763	2,677	2,748	2,904	3,257	196,038
North Dakota	3,905	21,865	17,960	14,259	13,259	13,495	11,143	6,025	104,763
Ohio	− 561	5,005	5,566	6,260	5,478	4,785	4,353	3,880	666,390
Oklahoma	− 4,539	191,948	196,487	200,699	214,661	215,862	202,817	185,851	8,226,368
Pennsylvania	120	6,276	6,156	6,472	8,179	8,230	8,531	9,107	1,221,640
Texas	−51,844	931,996	983,840	940,166	1,073,867	1,107,808	1,053,297	974,275	23,845,104
Utah	− 2,503	37,606	40,109	24,811	4,367	2,466	2,227	1,905	120,052
West Virginia	129	2,306	2,177	2,186	2,215	2,179	2,320	2,902	465,642
Wyoming	9,810	135,778	125,968	115,572	109,584	104,830	99,483	93,533	1,921,157
Other states	523	908	385	209	180	174	183	186	4,245
Total U. S.	− 899	**2,573,691**	**2,574,590**	**2,448,987**	**2,616,901**	**2,617,283**	**2,484,428**	**2,314,988**	**65,445,201**
Daily average	− 22	**7,032**	**7,054**	**6,710**	**7,170**	**7,151**	**6,807**	**6,342**	



Production per well by states

	Bbl. daily 1960	Producing wells	Daily avg. per well
Alabama	20,005	375	53.3
Arkansas	78,522	6,370	12.3
California	832,915	37,927	22.0
Colorado	128,981	2,390	54.0
Florida	1,030	11	93.6
Illinois	217,027	32,182	6.7
Indiana	31,694	5,388	5.9
Kansas	310,109	40,297	7.7
Kentucky	58,738	19,732	3.0
Louisiana	1,071,590	25,025	42.8
Michigan	42,828	4,410	9.7
Mississippi	143,937	2,621	54.9
Montana	82,514	3,973	20.8
Nebraska	66,907	1,672	40.0
New Mexico	296,240	12,991	22.8
New York	4,948	17,232	0.3
North Dakota	59,740	1,436	41.6
Ohio	13,675	15,765	0.9
Oklahoma	524,448	80,409	6.5
Pennsylvania	17,148	56,176	0.3
Texas	2,546,437	197,256	12.9
Utah	102,749	792	129.7
West Virginia	6,301	14,116	0.4
Wyoming	370,978	7,423	50.0
Other states	2,481	2,366	1.0
Total U. S.	**7,031,942**	**588,335**	**12.0**



1960 was a good year for gas

ALL SIGNS point to big things to come for the natural-gas industry. During the past year, firm moves were made in the right direction. The future will be bright if greater emphasis is put on finding more natural-gas reserves. Here's what happened in 1960:

- The second-biggest gain in natural-gas consumption of the last 9 years—nearly 13 trillion feet was marketed, an increase of 7.8% over 1959.
- Natural-gas reserves were up to 273.4 trillion cubic feet, a 4.1% gain of 10.8 trillion cubic feet over last year.
- Gas-well completions had the largest total since 1956. There were 3,952 gas wells finaled, representing a 4.7% gain over the previous year.
- Natural-gas liquids made a 4.6% rise which, though not up to par, is an indicator of full recovery from the sharp drop experienced in 1957. Recoverable natural-gas-liquid reserves now stand at 6.8 billion barrels, another all-time high.

Opposing these bright signs are some negative factors for 1960:

At the present rate of annual consumption of 13 trillion cubic feet of natural gas, the current reserve figure of 273.4 trillion cubic feet will last only 21 years. Concerning the future, we are worse off than we were last year at this time when we had more than 22 years of reserves at the demand rate then.

Another point of note is that although there were more gas-well completions in 1960, the prime effort was for field-well production. With only 336 wildcats

Thirteen states produce 98.5% of U. S. natural gas

(Millions of cubic feet)

	1960	Per cent change over 1959	1959	Per cent change over 1958	1958	Per cent change over 1957	1957	Cumulative 1906-1960	Cum. per cent of U. S.
Texas	6,110,000	6.8	5,718,993	10.4	5,178,073	0.4	5,156,215	76,789,177	41.84
Louisiana	2,990,000	11.9	2,670,271	8.9	2,451,587	17.9	2,078,901	29,148,633	15.88
New Mexico	843,000	13.9	739,660	−2.9	761,446	5.3	723,004	7,407,319	4.04
Oklahoma	824,000	1.5	811,508	16.5	696,504	−3.2	719,794	16,067,508	8.76
Kansas	641,000	6.1	604,410	7.6	561,816	−4.2	586,690	8,571,630	4.67
California	509,000	4.8	485,655	4.3	465,582	−5.4	492,338	15,459,723	8.42
West Virginia	206,000	0.7	204,633	....	204,581	1.1	202,440	10,223,761	5.57
Mississippi	173,500	7.0	162,095	1.2	160,143	−5.8	169,967	2,046,031	1.11
Wyoming	164,700	4.9	156,978	29.0	121,682	3.8	117,256	2,121,195	1.16
Colorado	104,800	4.9	99,899	21.1	82,464	−13.4	95,259	715,073	0.39
Pennsylvania	101,000	1.6	99,366	3.6	95,869	−5.8	101,801	5,712,078	3.11
Kentucky	75,300	2.4	73,504	1.7	72,248	3.2	70,024	2,085,267	1.14
Utah	53,600	37.7	38,921	102.2	19,247	14.4	16,824	264,661	0.14
Subtotal	12,795,900	7.8	11,865,893	9.1	10,871,242	3.2	10,530,513	176,612,056	96.23
Other states	191,800	6.4	180,222	13.3	159,006	6.2	149,745	6,913,768	3.77
Total U. S.	**12,987,700**	7.8	12,046,115	9.2	**11,030,248**	3.3	**10,680,258**	**183,525,824**	**100.00**

Gas wildcats off . . . . . . field wells up

State—	1959 Field wells	1959 Successful wildcats	1960 Field wells	1960 Successful wildcats	Change in total wells
Arkansas	32	9	27	9	− 5
California	46	27	87	27	41
Colorado	60	23	93	23	33
Illinois	8	1	6	2	− 1
Indiana	11	0	6	6	1
Kansas	130	44	158	42	26
Kentucky	285	4	250	14	−25
Louisiana	178	18	264	18	86
Michigan	46	8	22	4	−28
Mississippi	0	2	7	2	7
Montana	9	2	4	4	− 3
Nebraska	1	0	2	0	1
New Mexico	355	4	371	3	15
New York	7	1	15	13	20
North Dakota	0	0	0	0	0
Ohio	289	8	249	11	−37
Oklahoma	332	73	369	65	29
Pennsylvania	323	4	264	5	−58
Texas	720	59	668	64	−47
Utah	9	7	14	9	7
Virginia	10	0	8	0	− 2
West Virginia	527	23	682	4	136
Wyoming	53	21	47	8	−19
Miscellaneous	3	2	3	3	1
Total United States	**3,434**	**340**	**3,616**	**336**	**178**

. . . reserves rise

(Billion cubic feet at 60° F. and 14.65 psia.)

Jan. 1, 1960*	Jan. 1, 1961	Change
1,423	1,440	17
8,593	8,820	227
2,496	2,750	254
175	178	3
35	40	5
19,981	20,500	519
1,159	1,150	− 9
59,854	67,500	7,646
515	520	5
2,487	2,540	53
666	650	− 16
133	123	− 10
17,913	16,750	−1,163
106	118	12
1,207	1,178	− 29
749	675	− 74
16,651	17,400	749
1,052	1,145	93
120,476	122,500	2,024
1,264	1,500	236
39	39	0
1,594	1,675	81
3,847	3,975	128
182	204	22
262,597	**273,370**	**10,773**

*American Gas Association figures as of Jan. 1, 1960.

completed, there were 4 fewer new gas fields found. This means that known gas reserves were further increased by extension wells.

Trouble ahead? Natural-gas demand and reserve curves are going to collide in 20 years or less, if an accelerated exploration program isn't planned soon. It will take more drilling to find more gas unless the present success ratio is improved.

In 1960 a total of 46,651 wells (all categories) was drilled. Of these, 3,952 were successful gas wells. This is a pure gas-well success ratio of 8.5%. With demand at 13 trillion cubic feet and increase in reserves during 1960 only 10.8 trillion cubic feet, reserves increase lags demand by 16.9% for the year. To keep the reserves-demand ratio, there should have been 16.9% more wells drilled and that much more gas found.

Active areas . . . It is interesting to note that a half-dozen states have 92.7% of the nation's gas reserves. These are Texas, Louisiana, Kansas, Oklahoma, New Mexico, and California, in that order.

In total number of gas-well completions compared to last year, Texas was down 47 wells, Louisiana added 86 wells, Kansas up 26, Oklahoma up 29, New Mexico up 15, and California was up 41 wells. For new gas fields found, Texas was up five, Louisiana was the same as last year, Kansas was down two, Oklahoma down eight, New Mexico down one, and California had the same as last year.

Familiar names repeated during the year as the promised land of gas. In the Rockies, the Green River basin of Wyoming, with the Big Piney and LaBarge areas continued active. The Four Corners area and Utah's Lisbon showed continued promise of still greater reserves. In Texas, the Edwards trend provided many new successes along with the Gulf Coast area. On the West Coast the biggest thing going is the Sacramento Gas Valley. The east and west sectors of Oklahoma, the Arkoma and Anadarko basins, respectively, contributed added reserves. The Appalachian region remains active and the Ole Bull field of Pennsylvania created quite a stir. Southern Louisiana maintained high-level activity throughout the year.

Ohio has been a busy state during the year with Ashtabula County and other areas throughout the Clinton trend uncovering new gas. Wildfirelike activity ranges over most of West Virginia and there have been numerous wells brought in. Southwest Kansas experienced new gas finds in the Morrow fields of Seward, Clark, and Meade counties. Another area where good strikes have been made is the Uinta-Piceance Creek basin of eastern Utah and western Colorado.

This year more new names are bound to crop up. The Copper River basin of Alaska is a likely prospect. During the year a large gas well was found at West Fork, near Soldotna on the Kenai Peninsula, by Halbouty et al. This new area has barely been scratched. Yes, all in all, 1960 was a good year for gas.

Reserves barely hold own in '60

THE INDUSTRY can hardly boast of outstanding success in oil finding in 1960. Crude reserves at year end were just about even Stephen with a year before. Net gain in crude stood at only 9,263,000 bbl. Natural-gas liquids helped boost the total liquid gain, however; these rose by 301,353,000 to give a total liquids net gain of 310,616,000 bbl.

The gross addition to the reserves of crude oil and natural-gas liquids amounted to 3,203 million barrels; of this, 2,489 million was crude, and 714 million liquids. Deducting total production of 2,892 million barrels, the net gain stands at 311 million barrels for the year. This is a decline of 220 million barrels from the small gain in 1959.

All in all, it was a poor performance, and a direct reflection of lagging exploratory effort.

Proved crude reserves scoreboard

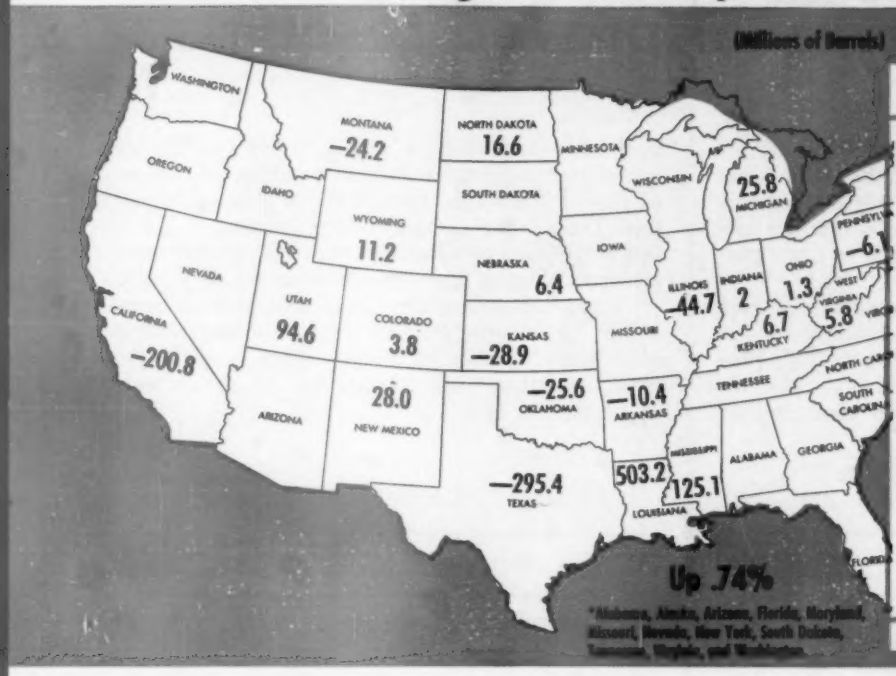
Not a proud performance

(Thousands of barrels—primary recovery)

State—	Proved reserves 1-1-60	1960 discoveries	1960 revisions and extensions	1960 production	Proved reserves As of 1-1-61	Proved reserves Year's change	Proved reserves Per cent of U. S.
Alabama	49,150	0	49,322	7,322	91,150	42,000	0.2
Alaska	102,500	30,000	40,000	780	171,720	69,220	0.5
Arkansas	372,300	4,000	15,739	28,739	363,300	−9,000	1.0
California total	4,395,000	10,550	78,385	304,442	4,179,493	−215,507	11.8
Coastal	931,000	250	27,906	74,498	884,658	−46,342	2.5
Los Angeles	1,106,000	7,250	7,687	92,127	1,028,810	−77,190	2.9
San Joaquin	2,358,000	3,050	42,792	137,817	2,266,025	−91,975	6.4
Colorado	401,000	15,000	29,207	47,207	398,000	−3,000	1.1
Illinois	679,000	5,000	30,432	79,432	635,000	−44,000	1.8
Indiana	75,000	3,000	10,600	11,600	77,000	2,000	0.2
Kansas	1,011,000	20,000	61,500	113,500	979,000	−32,000	2.8
Kentucky	203,000	6,000	17,498	21,498	205,000	2,000	0.6
Louisiana total	5,507,000	65,000	617,517	351,517	5,838,000	331,000	16.4
North	783,000	39,000	25,550	45,550	802,000	19,000	2.3
South	3,142,000	21,000	393,519	239,519	3,317,000	175,000	9.3
Offshore	1,582,000	5,000	198,448	66,448	1,719,000	137,000	4.8
Michigan	103,000	1,750	39,675	15,675	128,750	25,750	0.4
Mississippi	503,000	79,000	89,305	51,305	620,000	117,000	1.7
Montana	438,000	5,000	500	30,200	413,300	−24,700	1.2
Nebraska	140,000	7,500	23,488	24,488	146,500	6,500	0.4
New Mexico	1,057,000	15,000	106,735	105,735	1,073,000	16,000	3.0
New York	57,738	0	811	1,811	56,738	−1,000	0.2
North Dakota	384,000	9,500	31,865	21,865	403,500	19,500	1.1
Ohio	69,800	500	6,005	5,005	71,300	1,500	0.2
Oklahoma	2,204,000	66,000	90,375	189,375	2,171,000	−33,000	6.1
Pennsylvania	114,500	0	276	6,276	108,500	−6,000	0.3
Texas total	†15,621,000	204,000	322,731	891,731	15,256,000	−365,000	42.9
East (Dist. 5 & 6)	2,558,000	80,000	70,637	95,637	2,613,000	55,000	7.3
Gulf Coast (Dist. 2 & 3)	†3,307,000	40,000	45,403	153,403	3,239,000	−68,000	9.1
North (Dist. 7-B & 9)	1,089,000	22,000	56,406	116,406	1,051,000	−38,000	3.0
Panhandle (Dist. 10)	576,000	5,000	56,875	37,875	600,000	24,000	1.7
Southwest (Dist. 1 & 4)	1,279,000	16,000	23,870	78,870	1,240,000	−39,000	3.5
West (Dist. 7-C & 8)	†6,812,000	41,000	69,540	409,540	6,513,000	−299,000	18.3
Utah	508,000	29,000	99,606	37,606	599,000	91,000	1.7
West Virginia	50,600	0	1,306	2,306	49,600	−1,000	0.1
Wyoming	1,478,000	53,000	90,125	129,125	1,492,000	14,000	4.2
Others*	27,500	5,000	1,814	814	33,500	6,000	0.1
Total U. S.	†35,551,088	633,800	1,854,817	2,479,354	35,560,351	9,263	100.0

*Arizona, Florida, Maryland, Missouri, Nevada, South Dakota, Tennessee, Virginia, and Washington. †Adjusted.

Change in Total Liquid Reserves



Reserves by States

State	Jan. 1 1961	Jan. 1 1960	Change
Arkansas	393.9	404.3	—10.4
California	4,519.5	4,720.3	-200.8
Colorado	429.7	425.9	3.8
Illinois	645.1	689.8	- 44.7
Indiana	77.2	75.2	2.0
Kansas	1,179.0	1,207.9	- 28.9
Kentucky	259.0	252.3	6.7
Louisiana	7,368.0	6,864.8	503.2
Michigan	130.4	104.6	25.8
Mississippi	669.0	543.9	125.1
Montana	427.3	451.5	- 24.2
Nebraska	151.8	145.4	6.4
New Mexico	1,508.0	1,480.0	28.0
North Dakota	498.5	481.9	16.6
Ohio	72.4	71.1	1.3
Oklahoma	2,546.0	2,571.6	-25.6
Pennsylvania	112.1	118.2	- 6.1
Texas	18,756.0	19,051.4	-295.4
Utah	635.0	540.4	94.6
West Virginia	90.6	84.8	5.8
Wyoming	1,562.5	1,551.3	11.2
Others*	353.1	236.8	116.3
Total U. S.	42,384.1	42,073.4	310.7

*Alabama, Alaska, Arizona, Florida, Maryland, Missouri, Nevada, New York, South Dakota, Tennessee, Virginia, and Washington.

Estimated proved reserves of natural-gas liquids

Includes condensate, natural gasoline, and liquefied petroleum gases
(Thousands of barrels)

State—	Proved reserves* 1-1-60	1960 discoveries	1960 revisions and extensions	1960 production	Proved reserves— As of 1-1-61	Year's change	Per cent of U. S.
Arkansas	32,017	322	1,425	3,164	30,600	−1,417	0.5
California	325,318	828	51,826	37,972	340,000	14,682	5.0
Colorado	24,914	1,127	9,659	4,000	31,700	6,786	0.5
Illinois	10,754	63	1,075	1,792	10,100	−654	0.1
Indiana	124	84	−61	20	127	3	....
Kansas	196,912	1,470	8,497	6,879	200,000	3,088	2.9
Kentucky	49,290	1,848	6,129	3,267	54,000	4,710	0.8
Louisiana	1,357,798	31,180	213,760	72,738	1,530,000	172,202	22.4
Michigan	1,562	182	11	155	1,600	38	....
Mississippi	40,944	1,113	9,709	2,766	49,000	8,056	0.7
Montana	13,511	56	1,013	580	14,000	489	0.2
Nebraska	5,432	14	586	732	5,300	−132	0.1
New Mexico	423,040	4,228	29,532	21,800	435,000	11,960	6.4
North Dakota	97,928	35	−1,463	1,500	95,000	−2,928	1.4
Ohio	1,304	300	−484	0	1,120	−184	....
Oklahoma	367,569	5,558	33,353	31,480	375,000	7,431	5.5
Pennsylvania	3,677	1,883	−1,870	90	3,600	−77	0.1
Texas	3,430,375	66,738	216,487	213,600	3,500,000	69,625	51.3
Utah	32,376	203	3,951	530	36,000	3,624	0.5
West Virginia	34,166	4,802	6,532	4,500	41,000	6,834	0.6
Wyoming	73,279	455	1,846	5,080	70,500	−2,779	1.0
Others	18	7	−7	4	14	−4	....
Total U. S.	6,522,308	122,496	591,506	412,649	6,823,661	301,353	100.0

*Source: American Gas Association.

Journal survey of proved reserves

ON THESE PAGES are the estimated remaining reserves of crude oil and condensate for the larger fields of the United States. Eligibility for this list requires a 1960 production rate of at least 1,000 bbl. per calendar day; in Texas, the list is restricted to those producing 3,000 bbl. per allowable day.

Those major fields with an ultimate-recovery estimate of 100 million barrels or more are flagged by an asterisk and are included here regardless of daily production today. Powell field, in East Texas, for instance, produced only 258,000 bbl. in 1960, but its cumulative production of 127,210,000 bbl. certainly qualifies it to go down in history as one of our great oil fields. The largest field of all, of course, is famous East Texas, with a cumulative production of 3.5 billion barrels and a remaining reserve of 1.6 billion; this means an ultimate figure of more than 5 million barrels.

Figures in these tables are in thousands of barrels, and in the majority of cases refer to primary recovery only. The "Number of Wells" figure includes those producing oil or lease condensate. All figures are as of January 1, 1961.

ARKANSAS

Field—	1960 prod.	Cum. prod.	Est. reserve	No. wells
Champagnolle-Rainbow	555	21,487	8,513	127
Dorcheat-Macedonia	633	20,901	14,099	77
*El Dorado	1,176	74,578	25,422	630
Fouke	1,106	19,288	12,712	163
Kiblah	912	3,752	12,248	67
Lewisville	620	3,719	12,281	93
Lick Creek	626	936	7,064	50
*Magnolia	4,652	104,042	69,958	110
McKamie-Patton	1,264	23,796	41,204	45
Midway[1]	2,209	45,216	37,784	53
*Schuler	1,966	89,512	16,488	185
*Smackover	3,870	469,698	35,302	1,807
Stephens & Center	1,253	35,368	14,632	885
Urbana	1,358	18,948	14,052	563
Village	666	20,240	13,760	101
Wesson	1,749	37,284	17,716	253

(1) Consolidation—June 1960—Midway, West and Midway.

APPALACHIAN

*Allegany	1,244	157,514	27,486	....
*Bradford	5,104	609,836	47,164	....

CALIFORNIA

Coastal Region				
Aliso Canyon	1,729	35,064	20,938	116
Bardsdale	594	9,557	8,691	104
Casmalia	463	20,695	6,295	51
Castaic Junction	1,885	12,299	22,617	33
*Cat Canyon, West	3,221	97,247	42,667	282
Del Valle	400	21,623	5,382	66
*Elwood	618	100,425	9,431	36
Fillmore	1,370	9,079	15,931	42
Gato Ridge	792	26,691	9,304	47
Guadalupe	695	6,975	18,032	47
Honor Rancho	2,114	15,239	24,759	27
Lompoc	903	30,345	9,672	96
Montalvo, West	2,846	14,138	34,152	56
Newhall-Potrero	2,253	53,519	26,475	119
Oakridge	520	6,005	6,009	39
*Orcutt	926	122,518	12,478	253
Oxnard	2,733	19,538	35,454	101
Placerita	979	32,218	12,782	306
Ramona	521	15,882	6,250	121
*Rincon	4,022	73,443	41,596	344
*San Ardo	11,534	102,213	138,406	728
San Miquelito	1,159	45,666	19,327	100
*Santa Maria Valley	1,926	132,358	27,644	324
Saticoy	1,816	9,886	25,094	55

CALIFORNIA

Field—	1960 prod.	Cum. prod.	Est. reserve	No. wells
*South Mountain	6,682	87,132	67,877	467
Summerland Offshore	502	502	14,750	12
Torrey Canyon	552	12,515	17,518	56
*Ventura	17,121	639,951	185,044	1,125
Zaca Creek	587	13,670	8,328	38
Los Angeles Basin				
Bandini	390	3,526	5,496	48
Belmont Offshore	1,218	4,892	15,107	36
Beverly Hills	2,066	9,954	24,794	47
*Brea-Olinda	5,950	276,119	63,922	648
*Coyote, East	1,601	81,814	18,173	270
*Coyote, West	2,680	195,608	34,404	299
*Dominguez	3,602	225,721	39,250	323
*Huntington Beach	16,620	666,737	182,323	1,651
*Inglewood	4,541	221,226	49,009	529
*Long Beach	5,609	823,536	56,437	1,111
*Montebello	1,237	171,239	13,799	280
Newport, West	1,234	26,333	15,657	250
*Richfield	1,979	137,625	22,375	420
Rosecrans	987	79,587	10,406	209
Sansinena	2,447	28,523	36,480	141
*Santa Fe Springs	2,877	578,591	36,384	531
*Seal Beach	3,273	160,280	39,722	252
*Torrance	2,244	156,730	33,249	762
Whittier	576	25,856	6,153	154
*Wilmington	27,570	883,953	276,022	2,811
Yorba Linda	1,248	10,835	19,148	206
San Joaquin Valley				
Antelope Hills	532	8,496	6,386	48
Bellevue, West	389	1,288	3,660	8
Belgian Anticline	2,639	29,816	31,671	144
Belridge, North	468	65,551	6,469	82
*Belridge, South	4,576	83,965	46,016	1,402
*Buena Vista	9,762	489,964	110,087	1,142
*Coalinga, East	5,082	327,655	57,337	1,024
*Coalinga Nose	12,926	324,992	149,916	97
*Coalinga, West	2,431	190,105	29,887	942
*Coles Levee, North	4,909	108,865	51,144	170
Coles Levee, South	764	19,815	10,179	33
*Cuyama, South	12,235	139,309	135,638	206
*Cymric	3,418	76,431	33,603	525
*Edison	2,975	86,694	33,262	740
*Elk Hills	4,312	256,853	743,118	249
*Fruitvale	2,427	79,373	25,584	411
Gosford, East	1,977	10,218	19,815	75
*Greeley	2,462	85,101	29,906	43
Guijarral Hills	2,125	38,675	23,314	89
Helm	1,248	20,768	14,980	87
*Kern Front	2,054	97,339	22,662	687
*Kern River	7,010	356,726	84,126	3,090
*Kettleman North Dome	3,438	429,498	45,513	266
*Lost Hills	1,506	84,879	18,077	647

Field—	1960 prod.	Cum. prod.	Est. reserve	No. wells
CALIFORNIA (Continued)				
McDonald Anticline	626	4,917	7,508	67
*McKittrick	1,228	106,672	13,625	306
*Midway-Sunset	13,982	883,367	141,601	3,637
*Mount Poso	2,379	127,016	27,981	429
Mountain View	1,627	67,216	17,784	238
Premier	1,293	27,566	15,420	314
Raisin City	1,438	27,079	15,924	115
*Rio Bravo	3,268	96,325	38,676	76
Rosedale Ranch	620	4,533	6,206	44
Round Mountain	1,028	50,293	12,707	211
Russell Ranch	1,905	52,868	32,088	152
San Emidio Nose	2,230	3,534	26,765	20
Strand	818	11,212	10,678	29
Tejon-Grapevine	1,012	18,867	14,143	181
Tejon Hills	508	10,421	5,597	218
Tejon, North	3,617	8,175	42,107	69
Ten Section	1,463	64,395	17,594	112
Vallecitos	370	1,924	9,463	10
Wheeler Ridge	2,155	22,280	22,397	144

SOUTHEASTERN STATES

ALABAMA

*Citronelle	6,464	21,416	78,584	250
Pollard	638	6,573	4,427	37

FLORIDA

Sunniland	377	6,512	3,488	11

MISSISSIPPI

*Baxterville	5,901	77,826	62,174	190
Bolten	1,457	6,694	33,306	41
Brookhaven	1,924	51,958	23,042	147
Bryan	2,487	3,736	26,264	64
Church Hill	532	6,231	3,769	30
*Cranfield	1,099	45,375	54,625	110
Diamond	1,166	3,206	6,794	31
Eucutta	1,363	29,061	10,939	136
*Heidelberg	3,302	58,270	51,730	220
LaGrange & South	1,453	35,897	14,103	112
Little Creek	5,669	12,554	39,446	112
Magee	727	1,036	13,964	22
Mallalieu	601	29,671	10,329	34
Martinsville	703	1,963	8,037	18
Maxie-Pistol Ridge	1,000	6,746	18,254	206
McComb	2,533	2,679	47,321	121
Merit	608	795	9,205	11
Overton & North	459	4,008	3,992	28
Raleigh	2,157	4,788	45,212	50
Sandersville	380	1,897	8,103	20
*Soso	3,901	26,482	73,518	112
*Tinsley	3,234	160,039	39,961	261
Yellow Creek, E., W., & N.	1,170	17,959	12,041	137

TRISTATE

ILLINOIS

Albion	888	21,064	13,936	407
Allendale	447	11,116	3,884	405
Benton	467	35,565	6,435	237
Boyd	382	13,924	4,076	110
*Bridgeport (Old)	7,174	284,450	20,550	3,650
*Casey (Old)	1,427	90,000	25,000	2,700
Centralia	1,420	48,993	15,007	560
*Clay City	7,470	219,339	80,661	3,455
*Dale	2,506	68,346	31,654	1,120
Golden Gate	377	11,885	8,115	322
Herald	489	10,896	12,104	372
Inman, East	746	17,940	13,060	350
Iola	528	11,402	8,598	210
Johnsville	1,438	35,636	12,364	380
Kincaid	400	3,977	14,023	103
Lawrence	465	2,501	9,499	240
*Loudon	12,628	248,043	51,957	2,102
Mount Auburn	1,080	3,636	6,364	187
*New Harmony	5,252	105,174	39,826	1,835

Field—	1960 prod.	Cum. prod.	Est. reserve	No. wells
ILLINOIS (Continued)				
Phillipstown	653	19,071	5,929	405
*Robinson-Stoy (Old)	3,624	183,671	26,329	6,700
Roland	1,545	39,064	13,936	643
Sailor Springs	1,382	33,450	8,550	817
*Salem	8,482	280,085	69,915	2,383
Storms	644	9,300	10,700	230
West Frankfort	565	4,324	5,676	87
INDIANA				
Griffin Cons.[1]	2,300	46,719	13,281	671
Powells Lake	400	1,330	13,670	45
Springfield	1,002	10,744	13,256	277
Union-Bowman	1,255	11,971	8,029	601
Union Chapel, East	377	391	9,609	22
KENTUCKY				
Apex	975	5,074	5,926	435
Birk City	484	8,751	6,249	413
Morganfield, South	406	5,790	12,210	160
Poole	1,368	18,638	11,362	550
Smith Mills, North	392	4,508	8,492	50
Uniontown	615	17,686	3,314	238

(1) Cons. Jan. 1, 1960—includes: Foots Pond, West and Griffin pools.

MICHIGAN

Albion	2,080	2,334	22,666	101
Coldwater	585	19,873	5,127	85
Kawkawlin	446	11,559	3,441	400
McBain	472	515	4,485	25
Pulaski	1,628	1,787	23,213	105
Reed City	408	42,610	7,390	260
Reynolds	416	3,006	1,994	80
Scipio	3,514	5,413	19,587	120
Walker	890	14,898	10,102	760

LOUISIANA

NORTH LOUISIANA

Benton	532	13,859	4,141	13
Bethany Longstreet	787	4,825	10,175	75
*Caddo	6,118	257,607	142,393	6,550
Catahoula Lake, West	668	7,108	6,892	67
Clayton	382	1,709	13,291	25
Colquitt	887	5,160	4,840	37
*Cotton Valley	1,850	100,637	14,363	250
*Delhi	5,422	110,550	114,450	290
DeSoto (Red River)	638	66,857	8,143	400
Esperance Point	1,273	10,598	13,402	52
Greenwood-Waskom	797	7,904	17,096	337
*Haynesville (Ark. & La.)	1,666	134,483	40,517	322
Haynesville, East	618	15,579	9,421	105
*Homer	514	86,836	13,164	319
Killens Ferry	470	1,520	8,480	43
*Lake St. John	1,597	73,940	41,060	90
Lisbon	1,434	35,477	26,523	220
Locust Ridge	1,000	4,657	11,343	30
Nebo	1,475	45,625	14,375	143
Olla	1,283	44,735	10,265	160
*Rodessa (La. & Tex.)	1,263	126,740	58,260	332
Rodney Island	706	3,072	8,928	19
Ross Bayou	386	3,503	3,497	25
Shongaloo	415	1,183	8,817	36
Shongaloo-North Red Rock	1,475	7,598	12,402	150
Sligo	1,423	18,333	9,667	180
Urania-Georgetown	810	40,629	9,371	360
SOUTH LOUISIANA—OFFSHORE				
*Bay Marchand, Blk. 2†	9,858	42,156	157,844	276
Eugene Island, Blk. 18	2,482	6,454	33,546	55
Eugene Island, Blk. 32	889	6,173	18,827	17
*Eugene Island, Blk. 126	3,176	20,714	104,286	79
Eugene Island, Blk. 128	2,063	7,055	32,945	47
Eugene Island, Blk. 188	1,026	1,895	13,105	20

Field—	1960 prod.	Cum. prod.	Est. reserve	No. wells
SOUTH LOUISIANA—OFFSHORE (Continued)				
Grand Isle, Blk. 16	3,819	9,172	55,828	87
Grand Isle, Blk. 18	1,813	13,035	25,965	37
Grand Isle, Blk. 47	3,974	10,030	49,970	68
*Main Pass, Blk. 69	7,305	45,457	154,543	182
Ship Shoal, Blk. 154	1,565	6,177	33,823	37
Ship Shoal, Blk. 176	682	682	11,318	16
*South Pass, Blk. 27	7,274	21,102	128,898	198
South Timbalier, Blk. 131	697	1,057	10,943	14
Vermilion, Blk. 120	389	1,064	10,936	12
West Cameron, Blk. 45	2,449	2,645	22,355	15
*West Delta, Blk. 30	7,444	22,476	107,524	174
SOUTH LOUISIANA—ONSHORE				
Anse la Butte	1,660	43,519	31,481	145
Avery Island	3,097	42,158	35,842	109
Avondale	645	5,817	5,183	25
Bancroft & North	513	13,636	16,364	27
Barataria	395	22,932	9,068	20
Bastian Bay	940	8,687	8,313	31
Bateman Lake	2,941	27,774	30,226	73
Bay de Chene	2,197	17,470	27,530	90
Bay St. Elaine	4,720	42,220	32,780	156
Bayou Blue	773	17,580	8,420	84
Bayou Choctaw	1,465	15,892	25,108	82
Bayou Couba	561	9,148	8,852	39
Bayou des Allemands	665	11,651	4,349	35
Bayou des Glaise	686	6,937	6,063	18
Bayou Fordoche	462	4,630	9,370	17
Bayou Mallet & South	655	15,068	12,932	34
Bayou Pigeon	668	4,232	10,768	28
*Bayou Sale	3,613	68,323	33,677	115
Bayou Sorrel	1,259	6,147	13,853	39
Bayou White	371	4,163	7,837	16
Belle Isle†	880	6,400	18,600	30
Big Bayou Pigeon	412	1,968	6,032	14
Big Lake	616	4,917	7,083	25
Black Bay, East	375	2,090	9,910	16
Black Bay, North	468	2,010	7,990	19
Black Bay, West	3,367	9,422	50,578	123
Black Bayou	426	23,340	14,660	22
Bonnet Carre	873	1,771	8,229	27
Bosco	777	37,313	8,687	38
Breton Sound, Blk. 20	416	3,074	7,926	11
Bully Camp	1,384	16,158	16,842	59
Burrwood	776	1,881	4,119	25
*Caillou Island†	16,694	159,722	140,278	472
Cankton, North	594	12,140	17,860	53
Cecilia	445	1,002	4,998	10
Chacahoula	892	27,857	19,143	47
Charenton	1,371	32,955	20,045	146
Clear Creek	1,111	3,697	30,303	40
Clovelly	1,428	8,245	15,755	40
Cote Blanche Bay, West	2,509	32,965	21,035	117
Cote Blanche Island	1,814	6,983	17,017	42
Cowpen Creek	463	2,976	21,024	28
Cox Bay	2,031	23,406	19,594	68
Crowley, North	705	31,883	13,117	35
Delacroix Island	787	10,590	4,410	30
Delta Duck Club	1,651	13,655	17,345	76
*Delta Farms	2,923	82,735	27,265	108
Dog Lake	740	17,968	8,032	43
Duck Lake	2,151	26,313	21,687	56
Egan	1,521	31,444	7,556	47
*Erath	3,590	87,814	62,186	65
Fausse Pointe	1,559	14,416	20,584	56
Fordoche	507	8,732	13,268	28
Franklin	631	4,142	9,858	20
Garden Island Bay	2,062	32,138	27,862	122
Gibson, Northeast	491	14,257	10,743	16
*Golden Meadow	2,350	75,425	34,575	265
Good Hope	815	25,429	12,571	31
*Grand Bay	4,008	68,386	81,714	180
Grand Coulee	666	2,560	8,440	22
Grand Lake	859	17,896	12,104	37
Gueydan & West	1,031	32,779	9,221	53
Hackberry, East	792	50,351	17,649	81
*Hackberry, West	4,058	67,642	66,358	200
Horseshoe Bayou	671	17,378	15,622	23
Hurricane Creek	387	6,405	15,595	34
Iberia	687	51,683	8,317	55
*Iowa	753	90,147	36,853	51
Jeanerette	996	26,440	17,560	76

Field—	1960 prod.	Cum. prod.	Est. reserve	No. wells
SOUTH LOUISIANA—ONSHORE (Continued)				
*Jennings	861	110,773	21,227	114
Jennings, South	443	1,092	3,908	3
Johnson Bayou	596	778	9,222	20
Kent Bayou	576	4,316	6,684	16
Kinder	619	4,858	23,142	41
Krotz Springs	2,618	17,082	19,918	36
*Lafitte	3,442	101,089	48,911	130
*Lake Barre	5,231	38,516	61,484	130
Lake Chicot	736	17,480	5,520	27
Lake Hatch	473	2,664	5,336	20
Lake Long	428	13,041	4,959	14
Lake Mongoulois	569	10,410	10,590	29
Lake Palourde, East	1,672	9,122	17,878	35
*Lake Pelto	4,603	41,677	58,323	123
Lake Salvador	2,291	31,946	44,054	84
Lake Verret, West	1,066	26,032	18,968	66
*Lake Washington†	10,863	63,202	146,798	341
La Pice	716	14,398	13,602	36
La Rose	794	5,525	11,475	26
*Leeville	3,769	72,611	52,389	164
Little Lake	2,232	16,465	38,535	71
Little Temple	816	2,431	7,569	23
Lockport	730	25,702	20,298	65
Main Pass, Blk. 35	3,143	26,439	45,561	85
Napoleonville	585	6,691	14,309	31
Neale	428	17,008	10,992	40
Opelousas	378	3,824	11,176	17
Orange Grove	385	2,330	7,670	16
*Paradis	2,375	64,342	35,658	79
Patterson	997	3,128	8,872	32
Perry Point	722	1,242	14,758	21
Phoenix Lake	932	12,992	15,008	42
Pine Prairie	484	21,994	12,006	71
Plumb Bob	594	5,199	8,801	25
Pointe au Fer	384	13,401	3,599	16
Pointe-a-la-Hache	1,360	22,085	15,915	62
Port Barre	889	31,196	12,804	69
Potash	494	10,962	4,038	20
*Quarantine Bay	3,130	65,839	46,161	119
Raceland	485	13,398	8,602	20
Romere Pass	2,618	34,826	33,174	59
Saturday Island	630	1,583	7,417	16
Section 28	1,056	16,405	20,595	60
Southeast Pass	423	3,199	6,801	17
*South Pass, Blk. 24†	16,528	101,344	183,656	525
St. Gabriel	553	26,953	13,047	30
Sweet Bay Lake	1,037	4,647	11,353	28
Sweet Lake	545	14,994	5,006	31
Tepetate	499	21,468	3,532	37
Tepetate, West	501	19,361	4,639	25
*Timbalier Bay†	11,695	56,567	143,433	318
University	501	42,268	13,732	48
Valentine	937	21,457	27,543	53
*Venice	4,306	84,974	48,026	132
Ville Platte	676	53,346	23,654	64
*Vinton	1,656	93,537	36,463	145
Washington	770	5,769	19,231	14
*Weeks Island	8,422	99,743	91,257	171
*West Bay	5,282	50,443	49,557	200
West Delta, Blk. 52	839	1,292	13,708	27
West Delta, Blk. 53†	817	5,168	16,832	13
West Delta, Blk. 83	2,834	5,807	44,193	47
White Castle	971	27,986	13,014	44
White Lake, East	1,007	22,558	25,442	44
White Lake, West	453	6,243	9,757	15

†Combined offshore and onshore.

OKLAHOMA

*Allen	1,525	88,207	11,793	901
Atlantic	1,111	11,685	18,315	165
Autwine	373	615	9,385	75
*Avant	268	103,669	3,331	590
Bald Hill	559	59,553	3,447	761
Beebe-Konawa	697	32,031	4,969	440
*Bowlegs	905	139,983	10,017	181
Bradley Cons.†	2,631	19,207	20,793	201
*Burbank	15,676	378,555	96,445	2,510
Cache Creek	1,041	18,158	5,842	305
Camrick	873	2,376	7,624	113

Field—	1960 prod.	Cum. prod.	Est. reserve	No. wells
OKLAHOMA (Continued)				
*Cement	3,836	101,458	23,542	1,565
Chickasha	441	4,765	7,235	223
Criner, East	923	1,896	8,104	49
Cumberland	1,219	57,226	17,774	139
*Cushing	2,515	413,256	41,744	1,823
Davenport	613	25,630	9,370	305
Dora	844	11,317	8,683	133
Doyle	1,798	28,648	23,352	324
Dower, Northwest	442	902	9,098	37
*Earlsboro	267	135,744	4,256	88
Edmond, Northeast	554	14,872	10,128	219
*Edmond, West	853	110,308	19,692	555
*Elk City	1,741	54,150	65,850	301
Empire-Comanche	373	34,213	10,787	387
*Eola-Robberson	3,470	48,504	51,496	453
*Fitts	950	116,791	8,209	445
Flat Rock	482	46,854	13,146	565
Flint Creek	461	1,297	8,703	58
Flint Creek, South	457	590	9,410	32
Garber	761	66,580	6,420	565
*Glenn Pool	3,200	265,261	34,739	1,765
*Golden Trend[2]	11,071	205,967	104,033	2,223
Happy Valley	403	4,635	10,365	87
*Healdton	2,154	236,458	13,542	2,099
*Hewitt	2,938	160,929	24,071	1,443
Hoover, North	922	17,792	13,208	477
Hoover, Southeast	407	2,550	2,450	25
Iron Post	898	15,895	7,105	451
Joiner City[3]	1,561	2,849	17,151	105
Jones	622	8,338	4,662	143
Knox	2,206	37,761	47,239	402
Lauderdale	419	20,149	6,851	303
*Little River	388	130,376	4,624	143
Loco	1,309	22,810	12,190	952
Lone Elm, South	389	1,161	3,839	76
Lucien	710	45,375	6,625	207
Madill, North	542	3,735	6,265	74
Mannford Area	411	12,686	7,314	535
Mocane Laverne[4]	529	1,063	38,937	400
Moore	372	12,825	7,175	30
Moore, West	903	17,130	32,870	313
Mount Vernon	713	5,444	4,556	77
Mount Vernon, Southwest	370	3,571	6,429	123
Naval Reserve	2,353	35,026	13,974	487
Noble, Northwest	549	781	9,219	27
*Oklahoma City	2,851	716,651	53,349	567
Olympic	967	35,867	5,133	370
Oscar	624	18,330	6,670	280
Pauls Valley	431	24,335	3,665	73
Payne & Northeast	1,437	3,645	16,355	87
Payson	893	7,039	7,961	189
*Seminole	696	164,497	10,503	277
*Sho-Vel-Tum	24,227	548,995	251,005	7,325
Slick	568	41,677	6,323	297
*St. Louis	1,422	191,157	9,843	509
Stroud	531	25,462	4,538	380
*Tonkawa	278	127,185	2,815	123
Tonkawa, East	400	1,899	8,101	80
Walters	424	31,844	8,156	303
Wanetta	471	3,601	8,399	91
Washington, East	415	3,448	2,552	10
Wewoka	880	55,159	7,841	407
Wildhorse	432	21,895	4,105	420
Yale-Quay	1,254	45,043	11,957	339
Northeast Stripper Area	8,726	486,044	88,956	11,875

Consolidations: (1) Bradley, May 1960, includes: Bradley and Bradley, North. (2) Golden Trend, April 1960, includes: Golden Trend; Erin Springs; Maysville; Maysville, West; Story, Southeast; Bradley, East; Lindsay, North; Lindsay, Northwest. (3) Joiner City, June, July 1960, includes: Joiner City; Joiner City, West; Healdton, South; Wilson, West; McKinistry. (4) Mocane-Laverne, May 1960, includes: Mocane; Laverne; Barby; Stockholm, West; Stockholm, Southwest; Gate Lake, Northeast; Doby Springs, Northwest; Nye; Genwood, South; Elmwood, Northeast; Elmwood, Northwest; Highland.

KANSAS

Barry	481	10,360	4,640	65
Basil Cons.[1]	691	1,887	8,113	100
*Bemis-Shutts Cons.[2]	4,403	175,503	174,497	1,089
Bloomer	837	51,100	13,900	260
Browning	430	11,211	9,789	133
Burrton-Haury	581	52,729	4,271	330
Cahoj	413	443	9,557	46
*Chase-Silica	3,331	220,581	39,419	1,280
Chitwood	582	11,045	5,955	69
Cooper	977	14,740	9,260	237
*El Dorado	4,508	245,839	34,161	1,585
Elrick	486	1,189	3,811	57
Eubank	421	673	4,327	26
Fairport	1,025	31,978	7,022	268
Garfield	478	7,057	14,943	236
Gates	646	11,467	4,533	145
Geneso-Edwards	1,574	66,036	19,964	375
Gladys	784	8,390	22,610	234
Gorham	1,070	65,427	19,573	431
*Hall-Gurney	3,255	87,606	19,394	1,247
Interstate	1,069	3,488	11,512	77
Irvin	557	4,054	3,946	87
Iuka-Carmi	734	22,383	9,617	251
John Creek	391	1,633	8,367	55
*Kraft-Prusa	2,319	89,190	30,810	670
Larned	393	4,121	3,879	60
Leiker, East	367	2,473	4,527	44
Lost Springs	2,084	17,048	11,952	635
Madison (see Seely-Wick)				
Marcotte	1,446	21,636	13,364	341
Morel	1,313	27,375	9,625	229
Nichols	806	3,147	7,853	77
Norton	549	5,159	4,841	116
Novinger	411	2,827	7,173	36
Ogallah	601	5,630	4,370	78
Paulsen Cons.[3]	478	695	9,305	85
Pleasant Prairie	1,812	3,725	26,275	80
Ray	1,287	25,088	4,912	163
Ritz-Canton	1,046	51,759	14,241	390
Rock[4]	570	7,887	7,113	113
Russell	561	18,610	2,390	185
Sallyards	505	16,595	8,405	193
Seely-Wick[5]	1,837	45,774	19,226	511
Spivey-Grabs	2,452	12,016	37,984	443
Stoltenberg	660	42,674	7,326	275
Sugarloaf, Southeast	379	2,606	7,394	49
Teeter	484	18,862	6,138	185
Thrall-Agard	643	33,006	8,994	343
*Trapp	2,856	172,392	37,608	1,135
Trenton (see Basil)				
Trico	1,060	6,915	12,085	165
Unger	797	4,484	10,516	135
Welsh-Bornholdt	872	32,293	8,707	415
Wellington	619	11,021	2,979	139
Wils	518	1,016	2,984	65
Eastern Shallow Stripper	5,515	253,939	48,061	8,115

(1) Basil and Trenton cons. Feb. 1960. (2) Bemis-Shutts and Koblitz cons. May 1960. (3) Paulsen and Northeast cons. Aug. 1960. (4) Rock and North cons. Feb. 1960. (5) Seely-Wick, Hamilton and Madison cons. June 1960.

NEW MEXICO

NORTHWEST NEW MEXICO

Bisti	4,736	17,707	38,293	369
Horseshoe	4,615	8,570	30,430	338
Verde	2,003	5,209	16,791	189

SOUTHEAST NEW MEXICO

Allison	1,085	3,622	13,378	29
Anderson Ranch (all zones)	1,056	7,797	24,203	25
Arrowhead	456	23,590	6,410	93
Artesia	870	13,442	10,558	430
Bagley	1,156	17,519	12,481	29
Bluitt-Penn.	1,005	1,170	13,830	18
Bronco	896	5,514	14,486	21
*Caprock & East	5,525	44,415	55,585	617
Crossroads	1,480	13,206	21,794	23
Dean	510	5,655	19,345	28
*Denton (all zones)	6,293	76,122	48,878	106

Field—	1960 prod.	Cum. prod.	Est. reserve	No. wells
SOUTHEAST NEW MEXICO (Continued)				
Dollarhide, West	1,607	20,963	19,037	182
Drinkard	1,465	49,472	25,528	457
Echols & East & North	398	4,140	5,860	13
El Mar	595	745	4,255	55
*Empire-Abo	3,513	4,464	95,536	163
Eumont	2,199	48,828	21,172	581
*Eunice	1,696	98,548	43,452	294
Eunice, South	1,116	16,069	16,931	224
Fowler (all sands)	712	7,521	7,479	23
Gladiola	6,031	32,217	27,783	106
Grayburg-Jackson	1,707	44,369	11,631	600
Hare	522	13,207	15,793	75
Henshaw, West	425	1,345	8,655	58
High Lonesome	487	1,070	8,930	60
*Hobbs	3,357	166,811	29,189	333
Jalmat	1,848	53,308	36,692	413
Justis	3,198	6,225	43,775	146
Kemnitz-Wolfcamp	1,910	6,074	20,926	36
King	524	3,190	11,810	18
Knowles & South	597	6,322	8,678	20
Langlie Mattix	2,955	54,529	35,471	900
Loco Hills	683	18,505	6,495	226
Lovington & East & West	2,137	35,411	19,589	254
Maljamar	2,820	43,388	36,612	426
Millman, East	619	1,017	8,983	54
*Monument	4,820	161,511	72,489	517
Moore	954	8,904	11,096	20
Paddock	482	12,864	7,136	110
Pearl-Queen	939	1,927	8,073	96
Ranger Lake	837	1,764	8,236	21
Saunders & South	2,306	18,506	15,494	101
Shugart	387	1,884	8,116	45
Skaggs	372	5,390	6,610	85
Square Lake	422	10,326	19,674	270
Terry-Blinebry	754	6,187	13,813	104
Townsend-Wolfcamp	795	13,421	36,579	93
*Vacuum	3,308	91,687	33,313	484
Vacuum, South-Dev.	753	1,347	8,653	13
Warren	1,095	12,842	11,158	50

ROCKY MOUNTAIN STATES

COLORADO

*Adena & South Adena	7,567	40,871	59,129	104
Badger Creek & West	570	4,488	5,512	27
Big Beaver	990	6,106	13,894	23
Bijou	414	1,081	6,919	34
Black Hollow	470	4,254	5,746	18
Bobcat	389	4,809	3,191	24
Cliff	484	4,046	2,954	29
Danforth Hills	518	1,193	7,807	7
Graylin & Northwest	432	7,483	5,517	41
Little Beaver Creek	1,601	12,187	40,813	60
Little Beaver, East	914	5,439	11,561	46
Moffat	540	7,974	7,026	18
Nuggett	399	1,075	3,925	19
Phegley	515	1,285	7,215	10
Pierce	716	3,214	2,786	18
Plum Bush Creek	1,021	6,059	3,941	21
*Rangely	17,135	299,972	116,028	431
Wilson Creek	2,800	45,070	14,930	40
Yenter	394	7,337	5,663	26

MONTANA

Cabin Creek	4,455	19,191	32,809	105
*Cut Bank	2,045	92,515	23,485	1,113
Elk Basin (see Wyoming)				
Glendive	456	4,777	5,223	13
Kevin Sunburst	721	65,705	9,295	1,251
Monarch	381	485	9,515	15
Outlook	617	1,882	8,118	15
Pennel	564	2,757	20,243	21
Pine Unit Area	5,171	26,167	53,833	150
Pondera	493	15,052	4,948	307
*Poplar, East	3,312	27,332	92,668	104
Stensvad	2,000	2,924	12,076	28
Sumatra & Northwest	2,136	11,185	23,815	87
Wills Creek	400	945	9,055	15
Wolf Springs	373	2,441	7,559	17

Field—	1960 prod.	Cum. prod.	Est. reserve	No. wells
NEBRASKA				
Ackman	425	425	9,575	43
Barrett	405	1,263	8,737	20
Brook	605	605	4,395	15
Cook	580	3,266	6,734	14
Enders	511	3,958	6,042	18
Lodgepole (Kimball)	384	3,750	11,250	37
Potter, Southwest	621	4,298	5,702	43
Russell	433	438	4,562	10
Singleton	1,562	2,532	12,468	35
Sloss Cons.[1]	1,674	9,582	15,418	70
Willson Ranch Cons.[2]	1,364	3,095	11,905	42

(1) Sloss Cons. Aug. 1960, includes: Sloss; Dietz; Haffeman, South. (2) Willson Ranch Cons. Jan. 1960, includes: Britam and Willson Ranch.

NORTH DAKOTA

Antelope	1,891	5,602	24,398	88
*Beaver Lodge-Tioga	3,378	25,857	77,143	150
Blue Butte	2,347	7,450	28,550	161
Capa	810	5,586	14,414	90
Charlson	1,190	6,939	32,061	93
Glenburn	648	719	14,281	33
Newburg	843	2,639	12,361	100
Rival Cons.[1]	1,560	2,810	22,190	53
*Tioga	2,887	27,050	127,950	200
Tioga, North	1,480	2,894	22,106	85
Wiley	506	648	4,352	31

(1) Rival and South Rival consolidated.

UTAH

*Aneth	8,185	28,531	153,469	195
Ashley Valley	1,390	10,971	14,029	27
Cahone Mesa	371	696	4,304	12
Ismay	701	1,445	8,555	30
*McElmo Creek	9,656	21,733	78,267	115
Ratherford	7,334	18,572	56,428	121
*Red Wash	3,709	14,442	85,558	123
Walker Hollow	370	1,310	9,690	11
White Mesa	5,219	14,380	60,620	96

WYOMING

Ash Creek & South	1,012	7,371	17,629	44
Beaver Creek	2,563	15,618	24,382	34
Big Muddy	1,840	44,957	18,043	146
Big Piney & Chimney Butte	843	1,512	7,488	50
Big Polecat	445	1,711	8,289	8
Big Sand Draw	1,858	32,706	22,294	25
Bonanza	2,500	33,544	36,456	49
Byron	2,570	47,205	32,795	107
Circle Ridge	537	11,261	8,739	87
Clareton & South	629	17,005	7,995	319
Cole Creek & Northeast	375	9,593	5,407	50
Cottonwood	2,124	15,850	31,150	43
Coyote Creek	815	1,305	15,695	3
Crooks Gap	445	9,634	8,366	10
Dead Horse Creek	725	2,421	7,579	23
Donkey Creek	2,567	6,610	33,390	20
Dugout Creek (Sussex, West)	858	10,479	9,521	109
*Elk Basin	20,665	174,517	225,483	231
Elk Basin, South	608	7,937	7,063	25
Fiddlers Creek	1,217	13,333	16,667	24
Four Bear	3,083	5,271	34,729	5
Frannie	2,734	51,659	24,341	91
*Garland & South	5,256	59,469	40,531	147
Gebo	1,256	12,711	12,289	43
Glenrock & South	2,320	33,631	16,369	185
Golden Eagle	765	8,265	11,735	12
*Grass Creek	4,285	76,121	23,879	88
Grieve Unit	4,145	13,083	51,917	25
*Hamilton Dome	7,482	70,454	39,546	92
Happy Springs & Jade	694	7,436	7,564	30
LaBarge & North	493	16,269	3,731	137
*Lance Creek	769	99,828	20,172	221
Little Buffalo Basin	2,119	19,498	17,502	31
*Lost Soldier	3,598	82,220	27,780	80
Meadow Creek & East & North	2,128	23,187	22,813	172
Miller Creek	1,033	1,056	8,944	2
Murphy Dome	3,001	15,933	19,067	19

Field—	1960 prod.	Cum. prod.	Est. reserve	No. wells
WYOMING (Continued)				
Mush Creek & Mush Creek, West, Skull Creek & North	715	15,784	26,216	725
North Fork	1,427	5,794	14,206	5
*Oregon Basin & West	5,187	97,745	59,255	300
Patrick Draw	2,339	2,339	47,661	5
Pilot Butte	389	8,472	5,528	6
Pitchfork	619	4,627	3,373	10
Robinson Ranch	850	1,591	8,409	10
Rock River	830	33,488	6,512	40
Rozet	425	432	9,568	4
Sage Creek & West	400	2,484	11,516	20
*Salt Creek	4,876	384,408	35,592	1,075
Salt Creek, East	1,000	6,321	13,679	9
*Steamboat Butte	2,901	46,742	54,258	45
Sussex	3,095	23,979	33,021	104
Torchlight	766	4,360	5,640	14
Wertz	2,273	41,297	40,703	36
Winkleman Dome	2,970	22,316	27,684	22

TEXAS

SOUTHWEST TEXAS

RAILROAD DIST. 1:				
Big Foot	961	15,224	19,776	625
Charlotte	803	19,798	17,202	281
Fashing	749	1,509	23,491	42
*Darst Creek	4,024	108,634	26,366	644
*Luling	2,319	116,638	20,362	908
Sacatosa	794	915	9,085	256
RAILROAD DIST. 4:				
*Agua Dulce-Stratton	5,039	156,862	68,138	446
Alazan, North	630	895	19,105	45
Borregos	2,399	24,431	25,569	204
Fulton Beach	1,665	24,893	29,107	242
Garcia	689	17,583	7,417	112
*Government Wells, North	1,021	81,928	18,072	353
Hoffman	1,322	35,313	14,687	420
Kelsey Deep	2,269	43,372	28,628	428
*La Gloria	2,666	75,967	74,033	171
Loma Novia	875	43,005	16,995	403
London Gin	378	8,987	6,013	53
Mustang Island	1,205	20,930	19,070	137
*Plymouth	3,833	111,176	48,824	264
Portilla	2,085	33,293	56,707	119
Prado	687	2,002	7,998	148
Red Fish Bay	545	10,320	9,680	74
Rincon	1,151	42,816	27,184	172
Rincon, North	424	1,456	8,544	77
*Seeligson (all zones)	10,918	195,187	204,813	828
Seven Sisters	828	46,616	13,384	250
Sun & East & North	1,571	26,789	13,211	226
Taft (all fields)	1,984	27,105	22,895	166
Tijerina-Canales	2,211	42,703	42,297	236
*White Point, East	2,137	72,839	37,161	387
Willamar & West	1,243	44,089	30,911	259

TEXAS GULF COAST

RAILROAD DIST. 2:				
Appling	440	3,982	16,018	35
Bloomington	760	19,166	17,834	96
Bonnie View	376	11,767	8,233	72
Burnell & Tulsita	2,880	42,298	32,702	145
Cottonwood Creek, South	383	6,195	5,805	49
Falls City	530	15,455	9,545	75
Francitas & North	921	12,433	17,567	70
*Greta	1,446	79,588	40,412	201
Helen Gohlke	725	16,810	13,190	101
Heyser	597	45,149	14,851	167
Lake Pasture	947	4,536	10,464	65
La Rosa	639	18,414	7,586	73
La Ward, North	631	13,107	11,893	95
Lolita	1,496	34,420	15,580	281
Mary Ellen O'Connor	1,078	10,465	39,535	161
McFaddin	408	25,095	9,905	60
Person	393	450	19,550	32

Field—	1960 prod.	Cum. prod.	Est. reserve	No. wells
TEXAS GULF COAST (Continued)				
Placedo & East	812	37,782	12,218	273
*Refugio (all fields)	1,510	82,566	67,434	201
Swan Lake	392	7,137	11,863	36
*Tom O'Connor	6,532	252,285	197,715	684
*West Ranch	4,101	121,758	128,242	673
RAILROAD DIST. 3:				
Amelia	706	27,991	12,009	99
*Anahuac	3,484	153,469	112,531	315
Bammel	478	3,401	6,599	15
*Barbers Hill	1,437	111,040	18,960	140
Bay City	830	24,672	5,328	62
Bender	441	5,081	9,919	65
Boling & South	1,326	35,725	44,275	184
Chenango	428	3,311	11,689	49
*Chocolate Bayou	3,953	71,878	35,122	74
Clam Lake	683	6,451	13,549	49
Columbus	415	2,641	17,359	40
*Conroe	5,162	387,994	212,006	812
Danbury	616	11,891	18,109	83
*Dickinson-Gillock	2,872	54,250	45,750	231
Fannett	1,119	33,486	16,514	75
Fig Ridge	1,145	22,333	17,667	71
Franks	496	3,116	7,884	31
*Goose Creek & East	2,466	107,643	42,357	319
Hampton, South	525	1,837	8,163	9
Hankamer & South	1,090	18,353	21,647	126
*Hastings	7,786	311,416	188,584	624
*High Island	4,906	62,424	102,576	223
Houston, North	475	2,282	7,718	7
*Humble (all fields)	1,341	144,085	27,915	427
*Katy, North	9,112	133,389	66,611	102
*Liberty, South	3,528	50,587	89,413	335
Livingston	718	28,185	16,815	123
Lovell's Lake	458	24,136	10,864	62
*Magnet Withers (all fields)	1,024	40,966	64,034	240
Manvel	1,053	60,627	24,393	149
Markham, North-Bay City, North	995	30,508	19,492	102
Martha	451	3,088	9,912	37
*Merchant-Hull	3,616	156,883	90,117	445
*Old Ocean	4,180	202,431	97,569	118
Orange	1,155	46,559	18,441	240
Oyster Bayou	1,812	47,799	22,201	50
Palacios	1,117	2,012	27,988	58
*Pierce Junction	2,928	83,218	116,782	242
Port Acres	1,264	3,447	22,553	25
Port Arthur	524	544	14,456	15
Port Neches	848	9,502	15,498	44
*Raccoon Bend	1,308	64,856	35,144	245
Red Fish Reef	1,486	14,840	25,160	69
Rose City	400	6,222	3,778	26
Sarah White	617	972	9,028	5
Saratoga & West	1,171	48,967	21,033	386
Sheridan	2,643	30,450	44,550	20
Silsbee & West	944	32,030	17,970	52
*Sour Lake	1,056	102,547	22,453	316
*Spindletop	706	136,665	13,335	148
Stowell	997	48,757	21,243	75
Sugar Valley	566	18,594	11,406	103
Sugarland	518	55,414	9,586	47
*Thompson	5,188	240,828	104,172	360
Tomball	1,132	62,587	19,413	372
Trinity Bay & West	801	5,994	14,006	53
Umbrella Point	670	1,799	13,201	32
Village Mills & East	1,562	28,106	21,894	181
*Webster	5,802	251,565	198,435	207
*West Columbia & New	3,079	134,404	55,596	235
Winnie, North	679	2,531	27,469	35
Withers, North	936	35,953	24,047	145

EAST TEXAS

RAILROAD DIST. 5:				
Corsicana	1,253	24,370	15,630	1,850
Opelika	557	8,602	31,398	84
*Powell	258	127,210	2,790	106
*Van	4,896	292,011	112,989	609
RAILROAD DIST. 6:				
Bethany	1,706	4,683	30,317	223
Carthage	766	28,104	16,896	121
Chapel Hill	484	6,159	8,841	42

Field—	1960 prod.	Cum. prod.	Est. reserve	No. wells
EAST TEXAS (Continued)				
Coke	536	12,269	11,731	84
*East Texas	43,124	3,453,903	1,657,097	18,856
*Hawkins	9,173	260,874	264,126	585
Haynes	695	5,817	19,183	146
Kildare	1,103	8,043	16,957	128
Long Lake	510	30,281	9,719	108
*Neches	1,920	17,599	167,401	228
New Hope	2,595	34,259	18,741	77
Pewitt Ranch	588	11,636	18,364	110
Quitman	2,994	44,886	35,114	278
Rodessa		(See North Louisiana)		
Shamburger Lake	548	1,425	8,575	48
Slocum	1,025	5,589	29,411	156
*Talco	3,654	174,090	75,910	613
Trix-Liz	807	1,039	23,961	138
Waskom	775	11,677	23,323	142
Wright Mountain	1,400	3,322	26,678	122
RAILROAD DIST. 7-B:				
Coleman County:				
Glen Cove	356	6,350	8,650	84
Goldsboro	889	4,702	10,298	197
Fisher County:				
Claytonville	780	7,607	12,393	79
Pardue	398	8,720	6,280	74
Round Top	966	19,016	10,984	198
Haskell County:				
Juliana	701	3,565	11,435	63
Sojourner	912	6,447	8,553	84
Nolan County:				
Dora, North	766	6,246	18,754	77
Hylton, Northwest	681	7,079	17,921	77
Nena Lucia	1,409	8,176	31,824	243
White Flat	562	7,072	12,928	65
Stonewall County:				
Boyd	755	8,145	26,855	69
Flowers (Canyon)	975	12,032	12,968	222
Katz	1,826	19,777	30,223	214
Old Glory	431	7,182	17,818	95
RAILROAD DIST. 9:				
Archer County:				
Hull-Silk-Sikes	974	55,119	24,881	411
Clay County:				
Joy	1,103	15,397	19,603	253
Cooke County:				
Gatewood	1,099	5,204	13,796	93
Sivells Bend	683	14,674	10,326	82
*Walnut Bend	2,214	52,516	47,484	396
Foard County:				
Rasberry	750	2,473	7,527	70
Grayson County:				
Big Mineral	1,120	11,823	23,177	118
Sandusky	498	6,370	3,630	32
Sherman	1,670	24,266	45,734	301
Knox County:				
Knox City, North	407	6,240	13,760	56
Voss	620	2,038	7,962	156
Wichita County:				
*Burkburnett	2,148	193,049	60,951	1,335
*Electra	1,951	186,562	30,438	2,751
*K.M.A.	3,939	127,150	57,850	1,760
Wilbarger County:				
Fargo	671	16,733	8,267	139
Wise County:				
Alvord	600	3,191	6,809	129
Boonsville	782	2,311	17,689	66
Chico, West	480	4,750	10,250	124
Young County:				
Langston-Kleiner	494	6,343	8,657	185
TEXAS PANHANDLE				
RAILROAD DIST. 10:				
*Badger	3,235	99,807	33,193	1,390
*Borger-Pantex	3,432	145,705	39,295	1,272
Fansworth	1,064	4,512	10,488	76
*Finley	2,842	125,886	54,114	737
Horizon	557	1,072	8,928	61
Quinduno	1,217	10,165	17,835	174
R. H. F.	831	1,622	8,378	58
Twin	920	3,009	11,991	92

Field—	1960 prod.	Cum. prod.	Est. reserve	No. wells
TEXAS PANHANDLE (Continued)				
Waka, West	710	2,640	12,360	46
*West Pampa	2,818	132,583	27,417	1,182
WEST TEXAS				
RAILROAD DIST. 7-C:				
Adamc	407	2,806	7,194	22
Amacker	827	6,005	13,995	41
Benedum-Spraberry	1,368	28,232	31,768	163
*Big Lake (all fields)	615	117,750	4,250	154
Bronte	582	7,877	7,123	94
Cope	461	2,986	7,014	47
Fort Chadbourne	2,742	36,597	23,403	130
Huildale (Penn.)	944	13,586	26,414	123
I. A. B.	937	2,489	17,511	74
*Jameson (all fields)	2,569	46,194	53,806	657
King Mountain	512	3,218	6,782	22
*McCamey	1,971	106,343	33,657	922
Neva, West	677	5,689	9,311	40
Olson	534	5,983	12,017	132
*Pegasus	3,838	48,268	88,732	318
Shannon	404	3,734	6,266	150
Spraberry Trend		(See Dist. 8)		
Susan Peak	434	9,197	10,803	67
Todd (all fields)	1,441	40,046	29,954	90
Wilshire	1,294	23,631	36,369	46
World	1,025	27,144	20,856	166
World, West	652	4,214	10,786	43
RAILROAD DIST. 8:				
Abell (all fields)	830	10,061	19,939	141
Adair	1,827	24,267	25,733	170
Amrow (Devonian)	527	5,001	10,999	19
*Andector	2,942	64,494	45,506	146
Andrews (all fields)	1,913	12,474	37,526	158
Andrews, North	661	687	9,313	31
Andrews, South	1,735	6,807	23,193	120
Anton-Irish	1,741	30,534	17,466	190
Armer	388	1,934	13,066	57
Arthur-Spraberry	1,258	5,714	19,286	104
Azalea	1,941	2,410	27,590	39
Bakke (all fields)	4,161	10,736	64,264	226
Bateman Ranch	478	7,869	12,131	73
Bedford	457	8,619	11,381	27
Block A-34	396	3,518	11,482	27
Block 9	758	2,018	9,982	55
Block 12, East	571	4,603	10,397	30
*Block 31	5,821	60,087	89,913	97
Brahaney	1,230	6,767	23,233	230
Breedlove	1,053	4,109	20,891	31
Buckshot	1,236	3,577	18,423	178
C-Bar	655	5,607	14,393	144
Cedar Lake	1,152	21,909	23,091	183
Clairemont	429	3,019	6,981	39
*Cogdell (all fields)	5,103	69,786	85,214	429
Cordona Lake	404	4,468	10,532	45
*Cowden, North	7,174	151,424	98,576	1,020
*Cowden, South (and Foster and Johnson)	6,646	178,898	121,102	1,403
Deep Rock	782	8,726	18,274	50
*Diamond-M	6,451	97,983	97,017	632
*Dollarhide	2,656	69,126	70,874	314
Dollarhide, East	409	1,092	8,908	14
Donnelly	429	3,628	11,372	78
Dora Roberts	1,941	13,036	39,964	80
Dorward	600	5,669	9,331	223
Double H	388	857	9,143	68
*Dune	4,856	21,264	78,736	755
Edwards	518	3,720	11,280	131
El Mar	1,142	1,354	18,646	107
Embar (all fields)	1,179	24,422	15,578	198
*Emma (and Triple N)	5,750	41,155	58,845	333
Emperor	2,756	20,781	29,219	320
Fasken	768	2,937	7,063	47
Flanagan	828	7,040	12,960	115
Fluvanna	1,324	8,241	26,759	133
Ford	437	1,274	13,726	90
Fort Stockton	1,103	12,937	19,063	312
*Fuhrman-Mascho	4,135	41,005	58,995	775
*Fullerton (all fields)	6,060	142,791	107,209	908
Garza	1,770	38,216	31,784	511
Geraldine (Ford)	1,103	2,829	17,171	206

Field—	1960 prod.	Cum. prod.	Est. reserve	No. wells
WEST TEXAS (Continued)				
Glasco (Devonian)	578	4,356	10,644	22
*Goldsmith	7,199	283,028	166,972	3,142
Goldsmith, East	461	3,788	6,212	62
Goldsmith, North	508	5,705	6,295	67
Goldsmith, West	1,264	5,879	24,121	183
Good	717	14,483	10,517	48
Good, Southeast	677	1,111	8,889	26
Grice	458	1,214	8,786	57
Halley	1,026	7,374	17,626	143
Harper	1,723	24,217	25,783	500
Harris	671	5,164	9,836	94
*Headlee	5,003	25,223	74,777	159
*Hendrick	2,151	234,670	37,330	409
*Howard Glasscock	6,312	212,560	74,440	1,690
Huntley	483	4,260	10,740	80
Hutex	1,260	6,136	23,864	44
Iatan-East Howard	1,807	38,628	21,372	688
Jo-Mill	2,970	18,556	57,444	213
*Jordan	2,671	60,652	39,348	414
*Kelly-Snyder	14,929	256,436	489,564	1,446
*Kermit	6,143	71,005	48,995	1,021
Kermit, South	532	1,442	8,558	35
*Keystone	5,368	169,915	133,085	915
Lea	840	7,820	17,180	78
*Levelland	5,879	118,962	131,038	2,033
Luther, Southeast	746	5,744	9,256	39
Mabee	1,544	18,214	26,786	247
Magutex	2,170	16,390	33,610	133
Martin	1,252	30,028	19,972	167
*McElroy	8,928	186,410	163,590	1,723
McFarland	1,596	12,440	47,560	346
*Means	3,546	54,717	75,283	643
*Midland Farms	4,685	63,701	86,299	375
Midland Farms, North	479	3,619	11,381	42
Midland Farms, Northeast	408	4,905	10,095	14
Monahans, North	1,054	4,586	25,414	56
Moore	474	5,512	14,488	245
Nolley	667	7,189	12,811	59
Oceanic (Penn.)	597	6,701	13,299	45
Parks	667	5,054	19,946	69
Pecos Valley	1,713	16,854	18,146	761
*Penwell	3,123	47,613	52,387	498
Post	620	1,836	8,164	215
*Prentice	3,654	37,180	62,820	423
Reeves (San Andres)	714	1,149	13,851	96
Reinecke	867	18,966	18,034	70
Revilo	998	4,768	30,232	287
Riley, North	738	8,233	6,767	84
Robertson	2,261	14,322	30,678	328
Robertson, North	913	3,071	14,929	109
Ropes	502	5,363	9,637	32
Running W	1,351	6,812	21,188	145
*Russell & North	4,927	46,022	84,978	325
S-M-S	554	5,275	9,725	78
*Salt Creek	3,264	33,888	66,112	110
*Sand Hills	4,687	83,335	46,665	846
Scarborough	2,917	15,162	39,838	296
*Seminole	2,558	101,568	78,432	351
Seminole, West	706	10,934	9,066	86
*Shafter Lake	2,398	37,560	62,440	522
Sharon Ridge	2,352	24,391	54,609	1,558
Shipley	2,221	15,658	14,342	325
*Slaughter	8,553	268,990	171,010	2,535
Snyder	1,174	11,369	28,631	445
Spraberry & Deep	629	7,261	12,739	73
*Spraberry Trend Area	11,502	141,803	108,197	2,428
Spraberry, West	627	4,539	10,461	55
Sweetie Peck	405	7,621	17,379	37
*TXL	9,243	157,796	117,204	656
Three Bar	651	14,959	12,041	61
Twofreds	583	2,072	7,928	76
Union	1,189	8,220	21,780	133
University Block 9	2,420	16,094	48,906	148
University Waddell	1,410	11,875	23,125	111
Vealmoor	809	16,302	48,698	75
Vealmoor, East	969	18,824	46,176	86
Virey	1,248	11,747	43,253	64
Waddell	2,255	30,324	49,676	370
War-San	878	6,836	23,164	38
*Ward, South	3,204	77,683	47,317	1,135
*Ward-Estes, North	15,032	114,562	128,438	1,805
*Wasson (66 & 72)	11,711	354,630	295,370	2,068
Welch	2,098	32,256	27,744	406
Wellman	607	10,994	9,006	30
Wemac	486	4,266	7,734	23
West	537	1,955	13,045	18
Westbrook	1,487	25,309	33,691	453
Wheeler	646	25,179	24,821	70
Yarbrough & Allen	1,118	21,280	18,720	81
*Yates	5,475	467,768	182,232	682

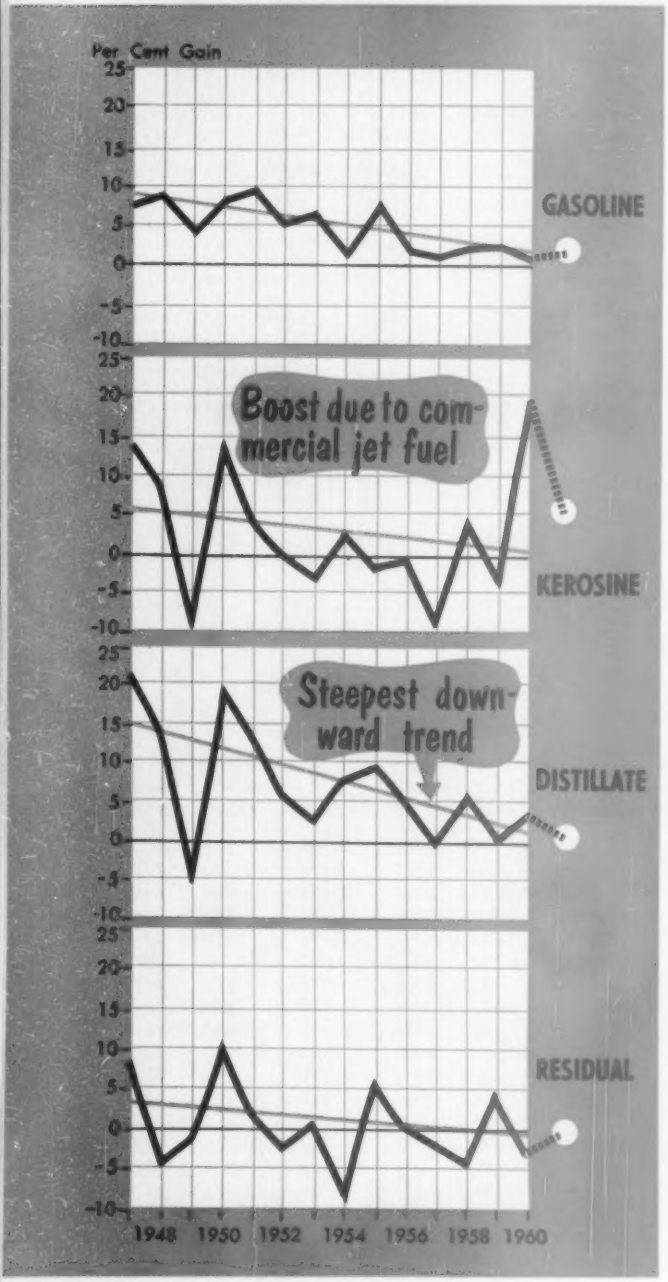
How "giant" fields compare with all fields (crude oil)

(Millions of barrels)

State—	Number of giants	1960 production			Estimated ultimate			Remaining reserve		
		All fields	Giant fields	Giants per cent	All fields	Giant fields	Giants per cent	All fields	Giant fields	Giants per cent
Texas	88	891.73	434.82	48.8	39,101	24,230	62.0	15,256	9,419	61.7
California	41	304.44	228.21	75.0	16,205	13,594	83.7	4,179	3,228	77.2
Louisiana	34	351.52	173.64	49.4	11,337	5,371	47.4	5,838	2,584	44.3
Oklahoma	21	189.38	81.23	42.9	10,397	5,283	50.8	2,171	845	38.9
Wyoming	9	129.13	55.02	42.6	3,413	1,618	47.4	1,492	526	35.3
Illinois	8	79.43	48.56	61.1	2,867	1,825	63.7	635	346	54.5
New Mexico	7	105.74	28.51	27.0	2,590	1,022	39.5	1,073	378	35.2
Kansas	6	113.50	20.67	18.2	4,288	1,327	30.9	979	336	34.3
Mississippi	5	51.31	17.44	34.0	1,304	650	49.8	620	282	45.5
Arkansas	4	28.74	11.66	40.6	1,450	885	61.0	363	147	40.5
Utah	3	37.61	21.55	57.3	719	382	53.1	599	312	52.1
Colorado	2	47.21	24.70	52.3	992	516	52.0	398	175	44.0
Montana	2	30.20	5.36	17.7	779	236	30.3	413	116	28.1
N. Y.-Pa.	2	8.09	6.35	78.5	1,583	842	53.2	165	75	45.5
North Dakota	2	21.87	6.27	28.7	508	258	50.8	404	205	50.7
Alabama	1	7.32	6.46	88.3	127	100	78.7	91	79	86.8
Other states	0	82.13	0	0	3,345	0	0	884	0	0
Total U. S.	235	2,479.35	1,170.45	47.2	101,005	58,139	57.6	35,560	19,058	53.6

U. S. demand at new peak, but gain is nothing to cheer

Gains in Domestic Demand



DOMESTIC DEMAND for petroleum products averaged 9,631,000 bbl. daily last year. The total represented an all-time record, but the gain over 1959 was only slightly more than half the annual average gain over the past 5 years. Last year's increase amounted to 180,000 bbl. daily compared with 332,000 bbl. daily for the 1954-59 period.

Domestic demand for 1961 is expected to reach 9,835,000 bbl. daily for a gain of 204,000 bbl. daily over 1960. This increase of 2.12% is based on an upturn in the general economy after the second quarter. The timing of the upturn and the rate of recovery will have a definite effect on petroleum demand for the year.

Gross national product, measured in current dollars, reached a peak in the second quarter of 1960. The downturn was very definite for the last half of the year. It will continue into 1961. The bottom of the sag may be reached by the middle of this year. This is the basis for the Journal's forecast of demand for 1961. If the "adjustment" in the economy flares into a recession, the projected gain will be replaced by a loss.

On the above basis, gasoline demand for 1961 is projected at 4,211,000 bbl. daily for a gain of 2.01%. This rate is in line with the postwar trend. The gasoline chart in the series on the left shows a decided downward slope for the years since the end of World War II. The annual gain dropped below 4% in 1954, the first to sink to that level since the war. Note that the annual gain has not been back up to 4% since 1955.

Part of the general downward trend has been due to annual losses in demand by the aviation component of gasoline. There is little demand for avgas from the Armed Services, and commercial aviation is rapidly shifting to jets.

This last item also relates to the high percentage gains in sales of kerosine. A glance at the broken line in the chart for kerosine demand shows a sharp decreasing trend through 1947. Kerosine demand has been gaining for the past few years because it includes sales of commercial jet fuel which is a special grade of kerosine. The continuing shift to commercial jet planes will provide increases in kerosine demand, at least for a few years.

Distillate demand has a steep downward slope for two reasons. Demand for oil heat could not be met during the war. There was a flood of burner installations in the early postwar period which resulted in sharp gains in sales of distillate fuels. Gas has been a factor in low gains for recent years. Annual increases have been under 4% for the past 2 years and will be near 2% for 1961.

Domestic production will supply most of the additional raw material needed to meet demand increases in 1961. Part of the 1960 demand was met out of crude and product stocks. Further decline in product inventories is in order for 1961, but processors will build crude stocks back near 250,000,000 bbl. if crude is available.

If imports are held near the 1960 level, total domestic production should show a gain of better than 250,000 bbl. daily.

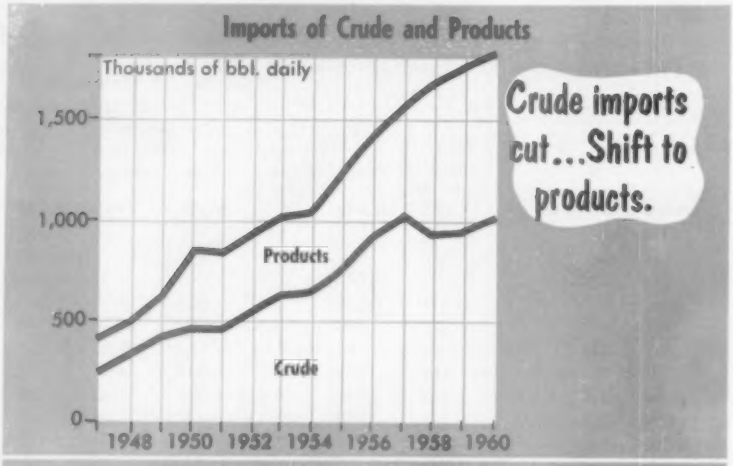
Journal forecast of supply and demand, by quarters

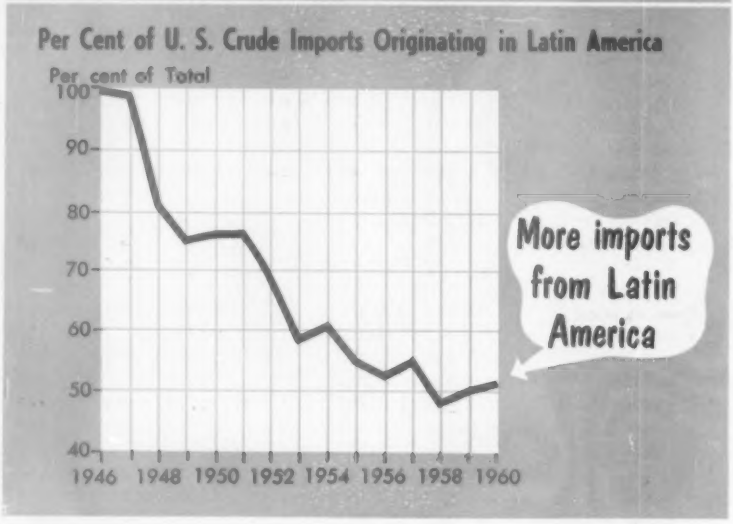
(Thousands of barrels daily)

		1st quarter		2nd quarter		3rd quarter		4th quarter		Year 1961	
	Year 1960	Vol.	Per cent change	Vol.	Per cent change	Vol.	Per cent change	Vol.	Per cent change	Vol.	Per cent change
Domestic demand	9,631	10,688	0.9	9,196	1.4	9,210	2.9	10,263	3.5	9,835	2.12
Gasoline	4,128	3,787	1.2	4,427	1.2	4,477	2.3	4,147	3.2	4,211	2.01
Kerosine*	361	511	4.3	249	10.7	304	10.1	474	4.4	384	6.37
Distillate	1,866	2,743	1.3	1,409	2.1	1,248	3.2	2,233	2.8	1,905	2.09
Residual	1,507	1,902	−2.8	1,327	−3.7	1,205	0.4	1,562	4.3	1,497	−0.67
Jet fuel	282	302	3.8	297	4.2	295	5.7	287	4.4	295	4.61
Lubricants	118	110	−2.7	124	0.8	121	1.7	116	0.9	118	
LP-gas	617	768	4.5	518	4.2	550	5.2	749	5.2	646	4.70
Asphalt & rd. oil	302	118	4.4	361	5.9	541	6.9	268	8.1	323	6.95
Other products	439	435	−0.7	472	2.4	457	1.8	415	1.0	444	1.13
Crude loss	11	12	33.3	12	20.0	12	33.3	12	−14.3	12	9.09
Exports	204	183	−9.9	206	−10.0	192		199	5.3	196	−3.92
Gasoline	39	32	−5.9	43	−10.4	39	5.4	37	5.7	38	−2.56
Kerosine*	2	1	−66.7	1		1	−50.0	1	−50.0	1	−50.00
Distillate	30	29	−6.5	27	−20.6	27	−6.9	27	3.9	28	−7.14
Residual	51	48	−15.8	52	−8.8	43	−4.5	50	16.3	48	−5.88
Jet fuel	1	1		1		1		1		1	
Lubricants	42	40	2.6	46	−2.1	41	−2.4	40	−2.4	42	
LP-gas	7	7		7	−12.5	7	−12.5	7		7	
Asphalt & rd. oil	3	2		3		3		3		3	
Other products	22	17	−15.0	20	−13.0	24	26.3	27	8.0	22	
Crude	7	6	−33.3	6	−25.0	6		6		6	−14.29
Total demand	9,835	10,871	0.7	9,402	1.1	9,402	2.9	10,462	3.5	10,031	2.00
Gasoline	4,167	3,819	1.1	4,470	1.1	4,516	2.3	4,184	3.2	4,249	1.97
Kerosine*	363	512	3.9	250	10.6	305	9.7	475	4.2	385	6.06
Distillate	1,896	2,772	1.2	1,436	1.6	1,275	3.0	2,260	2.8	1,933	1.95
Residual	1,558	1,950	−3.2	1,379	−3.9	1,248	0.2	1,612	4.7	1,545	−0.83
Jet fuel	283	303	3.8	298	4.6	296	5.7	288	4.3	296	4.59
Lubricants	160	150	−1.3	170		162	0.6	156		160	
LP-gas	624	775	4.5	525	4.0	557	4.9	756	5.2	653	4.65
Asphalt & rd. oil	305	120	4.4	364	5.8	544	6.9	271	8.0	326	6.89
Other products	461	452	−1.3	492	1.7	481	2.8	442	1.4	466	1.08
Crude	18	18		18		18	20.0	18	−10.0	18	
Stock change	−59	−590		423		465		−213		24	
Crude	−52	−10		50		50		49		35	
Products	−7	−580		373		415		−262		−11	
New supply	9,776	10,281	1.7	9,825	1.6	9,867	3.4	10,249	4.9	10,055	2.87
Imports	1,808	2,008	2.8	1,688	−7.5	1,628	−4.2	1,918	9.3	1,810	0.11
Crude	1,018	1,017	5.6	997	−6.7	1,017	−3.2	1,047	5.8	1,020	0.19
Products	790	991	0.1	691	−8.6	611	−5.9	871	13.9	790	
Production	7,968	8,273	1.5	8,137	3.7	8,239	5.1	8,331	3.8	8,245	3.48
Crude	7,032	7,285	1.2	7,192	3.6	7,282	5.2	7,329	3.8	7,272	3.41
Natural, etc.	936	988	3.6	945	4.1	957	4.1	1,002	3.9	973	3.95
Runs to stills	8,067	8,279	2.4	8,106	1.1	8,216	−0.1	8,294	4.4	8,224	1.95
Crude transfers	15	15		15	7.1	15	15.4	15	−6.3	15	
Total stocks†	786.2	733.1		771.6		814.3		794.7		794.7	
Gasoline	196.0	222.1		199.3		176.3		186.9		186.9	
Kerosine*	31.9	22.0		30.6		38.0		31.1		31.1	
Distillate	141.1	74.5		110.3		159.5		131.7		131.7	
Residual	46.0	42.4		45.6		52.5		54.3		54.3	
Other products	133.2	135.0		144.2		141.8		140.0		140.0	
Crude	238.0	237.1		241.6		246.2		250.7		250.7	

*Includes commercial jet fuel. †Millions of barrels at end of period.

Imports holding even with growth in U. S. demand and production





IMPORTS will increase again in 1961—but only slightly. In fact, it will be by far the smallest gain in many years, and well below the expected percentage gain in total U. S. demand.

It looks as though the mandatory imports-control plan, instituted in the spring of 1959, is meeting its objective fully. That objective was to hold imports to a rate of growth roughly equal to the growth in demand.

During 1960, the first full year of the plan, imports of crude and products increased 1.6% over 1959, while total demand increased 1.8%. If the 1961 forecasts hold, imports will increase less than 1% while demand will be up between 1 and 2%.

The anticipated gain this year is only 2,000 bbl. per day—all of it crude, and all of it from Canada.

This is based on the assumption that the new Kennedy administration will not change the formula, and that quotas for the last half of '61 will be computed on approximately the same basis as those in effect for the first half. So the forecast is that controlled imports (from offshore) will be less than in 1960 while the uncontrolled (crude from Canada by pipeline) will increase some 2,000 bbl. per day more than the cut in controlled imports.

The forecast for products imports is no change at all. This is shaky, because weather—and other influences—could cause changes in quotas for importation of residual fuel oil. These are set by quarters instead of for half years, and the policy on resid is to manipulate the supply so as to avoid sharp price changes.

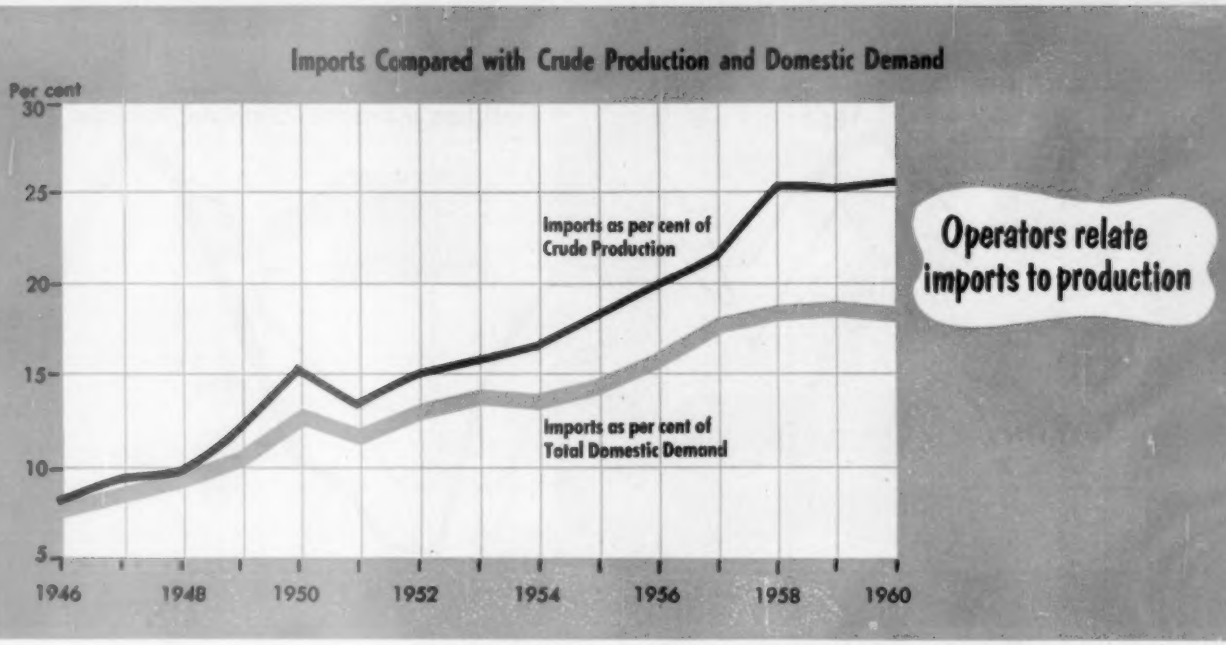
Ratios hold steady. By another statistical measurement the control program is also achieving its objective of stabilization of imports. During each of the last 3 years total imports of crude and products, controlled and uncontrolled, have been just a fraction of a point above 18% of domestic demand.

Source of crude imports*

FIRST 10 MONTHS
(Thousands of barrels daily)

	1960	1959	Change Volume	Change Per cent
Mexico	2.7	0.4	2.3	575.0
Colombia	39.4	33.3	6.1	18.3
Venezuela	489.4	444.1	45.3	10.2
Trinidad	0.7		0.7	
Brazil		1.8	− 1.8	−100.0
Kuwait	125.8	166.3	−40.5	− 24.4
Saudi Arabia	75.3	64.3	11.0	17.1
Neutral Zone	46.9	40.7	6.2	15.2
Iraq	17.4	23.0	− 5.6	− 24.3
Iran	38.3	25.9	12.4	47.9
Qatar	4.8	0.8	4.0	500.0
Egypt	0.9		0.9	
Algeria	2.7		2.7	
Canada	112.5	90.5	22.0	24.3
Sumatra	69.2	54.0	15.2	28.1
Borneo		12.3	−12.3	−100.0
Total	**1,026.0**	**957.4**	**68.6**	**7.2**

*Bureau of Mines.



And, as shown by the chart at the top of this page, imports have stabilized at a fraction of a point above 25% of U. S. crude production during the past 3 years.

In spite of this, domestic producers are agitating to have the quotas based on crude production instead of on domestic demand for all refined products. This is because product demand is growing faster than crude production, due to a number of factors including the fact that natural-gas liquids are filling an increasing share of the total market.

While imports have stabilized, the program hasn't. Changes were discussed throughout the year and there may be even more pressure for revision this year. In addition to the question of the desirable total level of imports there is great controversy within the industry as to how the crude quota should be divided among historic importers and inland refiners. And the formula for residual fuel oil satisfies almost nobody.

Imports-export record

(Thousands of barrels daily)

	Imports			Exports		
	Crude	Products	Total	Crude	Products	Total
1942	34	64	98	93	227	320
1943	38	136	174	113	298	411
1944	122	130	252	93	474	567
1945	203	108	311	90	411	501
1946	236	141	377	116	303	419
1947	267	170	437	127	324	451
1948	353	161	514	109	259	368
1949	421	224	645	91	236	327
1950	487	363	850	95	210	305
1951	490	354	844	78	344	422
1952	573	379	952	73	359	432
1953	648	386	1,034	55	347	402
1954	656	396	1,052	37	318	355
1955	782	466	1,248	32	336	368
1956	934	502	1,436	78	352	430
1957	1,023	552	1,575	138	430	568
1958	953	747	1,700	12	264	276
1959	965	814	1,779	7	233	240
1960:						
1st qr.	963	990	1,953	9	193	202
2nd qr.	1,068	756	1,824	9	220	229
3rd qr.	1,051	649	1,700	6	186	192
4th qr.*	990	765	1,755	6	187	193
Year	1,018	790	1,808	7	197	204
1961†	1,020	790	1,810	6	190	196

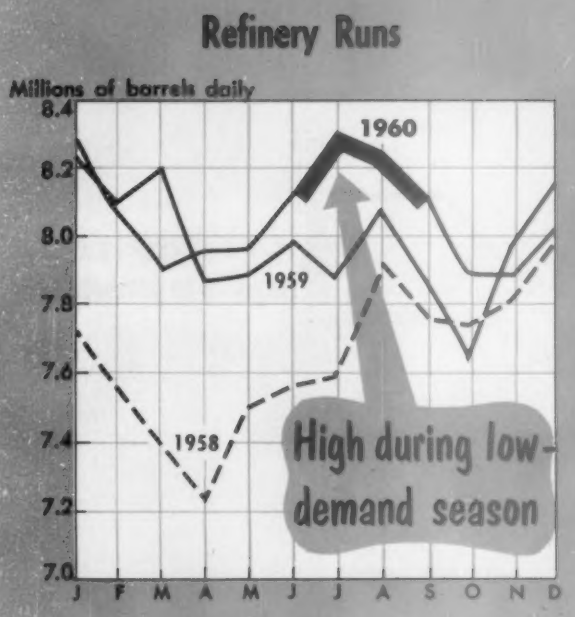
*Estimated. †Forecast.

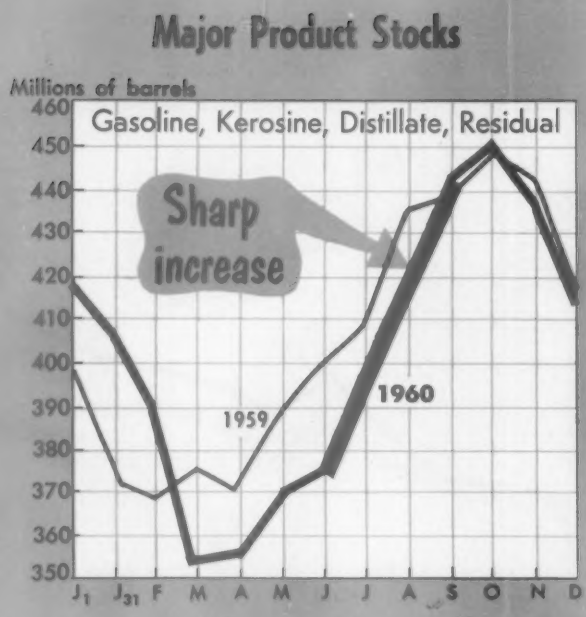
Source of imports. It is interesting to note that no tremendous shifts in sources of crude imports took place as a result of the control program. When controls were first imposed there were predictions that Venezuela would lose much of its U. S. market to the Middle East because of the price difference.

However, during the first 10 months of 1960 (all for which final figures were available at this writing) imports from Venezuela ran 45,000 bbl. per day above 1959, while those from the Middle East dropped 12,500 bbl. per day.

Canadian crude imports grew, but not spectacularly considering that they are not subject to quota. During 1960 Canada supplied 11% of U. S. crude imports compared with 9.5% in 1959.

As for the rest of our crude imports, Caribbean countries supplied 51.9% in 1960 compared with 50.1% in 1959; the Middle East supplied 30.1% compared with 33.5%; and the Far East 6.7% compared with 6.9%; and the newest contender for world markets, North Africa, entered the U. S. market with 3,600 bbl. per day, or 0.3% of our total imports.





Summer excesses in runs hit refiners

REFINING OPERATIONS for 1960 were characterized by the unusual things that happened during the year. Here are a few of them.

... Runs topped 8,000,000 bbl. daily for the first time as an average for the year.

... The period of peak refinery runs came during the season of lowest demand.

... Most of the summer buildup in runs came in two of the major refining districts.

... There was a big increase in major product stocks during the third quarter.

... Traditionally, April is the low month for refinery runs. The low month in 1960 was November at the start of the high-demand season.

Take a look at the above charts. The one on the left gives comparisons of refinery runs over the past 3 years. Runs were low in the first half of 1958 to correct for a big inventory buildup in the last half of 1957. Operations for 1959 were above the level justified by demand that year. Major product stocks increased 20,000,000 bbl. during the year. These events set the stage for operations in 1960.

Product demand was low in January to start the year. February demand showed very little increase over the previous year. These so-so months were followed by record-breaking demands in March. Major product stocks dropped 34,000,000 bbl., which would have been an excellent reduction even for January.

The right chart shows inventory levels in these months. The sharp drop in March left stocks in an excellent position to start the low-demand season. Note that there was no unusual buildup until after June.

The heavy line on the left chart shows the high level of refinery runs during the summer months. The heavy line on the right chart shows what these runs did to major-product inventories. The increase between the end of June and the end of September amounted to 67,400,000 bbl.

The chart at the bottom of the next page shows where most of the increases took place. The June-October stock increase was 3.09% larger than it was

Refinery Yield Trends

	Runs (thou. bbl. daily)	Yields (per cent) Gasoline	Kerosine	Distillate	Residual	Other
1937	3,242	43.6	5.5	12.4	26.4	12.1
1938	3,192	44.0	5.5	13.0	25.3	12.2
1939	3,391	44.5	5.5	13.1	24.7	12.2
1940	3,536	43.1	5.7	14.2	24.4	12.6
1941	3,861	44.2	5.2	13.4	24.3	12.9
1942	3,655	39.8	5.1	14.7	26.9	13.5
1943	3,917	37.3	5.0	14.8	29.2	13.7
1944	4,551	39.5	4.7	14.4	27.7	13.7
1945	4,711	40.5	4.7	14.5	27.3	13.0
1946	4,740	39.6	6.0	16.6	24.9	12.9
1947	5,075	40.2	6.0	16.8	24.2	12.8
1948	5,549	40.1	5.9	18.7	22.9	12.4
1949	5,326	43.7	5.2	17.4	21.7	12.0
1950	5,739	43.0	5.6	19.0	20.2	12.2
1951	6,494	42.4	5.7	20.0	19.7	12.2
1952	6,670	43.0	5.4	21.3	18.6	11.7
1953	7,000	43.9	4.8	20.7	17.6	13.0
1954	6,958	43.8	4.8	21.3	16.4	13.7
1955	7,480	44.0	4.3	22.0	15.3	14.4
1956	7,937	43.4	4.2	22.9	14.7	14.8
1957	7,919	43.8	3.8	23.1	14.4	14.9
1958	7,642	45.2	3.9	22.4	12.9	15.6
1959	7,994	44.8	3.8	23.1	11.8	16.5
1960*	8,067	45.3	4.6	22.5	11.1	16.5

*Preliminary.

Runs by districts in the U. S.

(Thousands of barrels daily)

	1925	1930	1935	1940	1945	1950	1955	1956	1957	1958	1959	1960	% of total 1960	% of total 1925
East Coast	352	472	466	559	750	908	1,065	1,126	1,194	1,105	1,119	1,120	13.9	17.4
Appalachian 1	(*)	(*)	72	92	98	96	98	101	102	94	96	96	1.2	(*)
Appalachian 2	69	88	33	40	56	69	96	102	94	100	103	100	1.2	3.4
Ill., Ind., Ky.	184	300	356	617	756	1,039	1,341	1,405	1,386	1,384	1,468	1,472	18.3	9.1
Minn., Wis., Dak.	(†)	(†)	(†)	(†)	(†)	(†)	58	86	95	99	104	121	1.5	(†)
Okla., Kans., Mo.	267	304	295	314	381	486	641	685	704	711	725	722	9.0	13.3
Texas Inland	99	164	169	169	231	209	254	272	270	272	285	292	3.6	4.9
Texas Gulf	297	426	550	923	1,105	1,312	1,841	1,957	1,886	1,744	1,846	1,897	23.5	14.6
Louisiana Gulf	139	113	118	123	272	470	656	696	649	667	706	664	8.2	6.8
Ark., La. Inland	44	56	48	68	77	71	91	94	91	96	88	107	1.3	2.2
New Mexico	(‡)	(‡)	4	5	12	14	21	24	26	24	24	23	0.3	(‡)
Other Rocky Mountain	72	57	48	77	114	185	255	268	273	266	291	285	3.5	3.5
West Coast	504	561	487	549	859	880	1,063	1,121	1,149	1,080	1,139	1,168	14.5	24.8
Total U. S.	2,027	2,541	2,646	3,536	4,711	5,739	7,480	7,937	7,919	7,642	7,994	8,067	100.0	100.0

*Included in Appalachian 2. †Included in Ill.-Ind. and Okla.-Kans. ‡Included in Rocky Mountain.

in the same period of 1959. The big gains were in Districts 1 and 3. Runs in District 1 were up 5.12%. District 3 operations gained 4.42%.

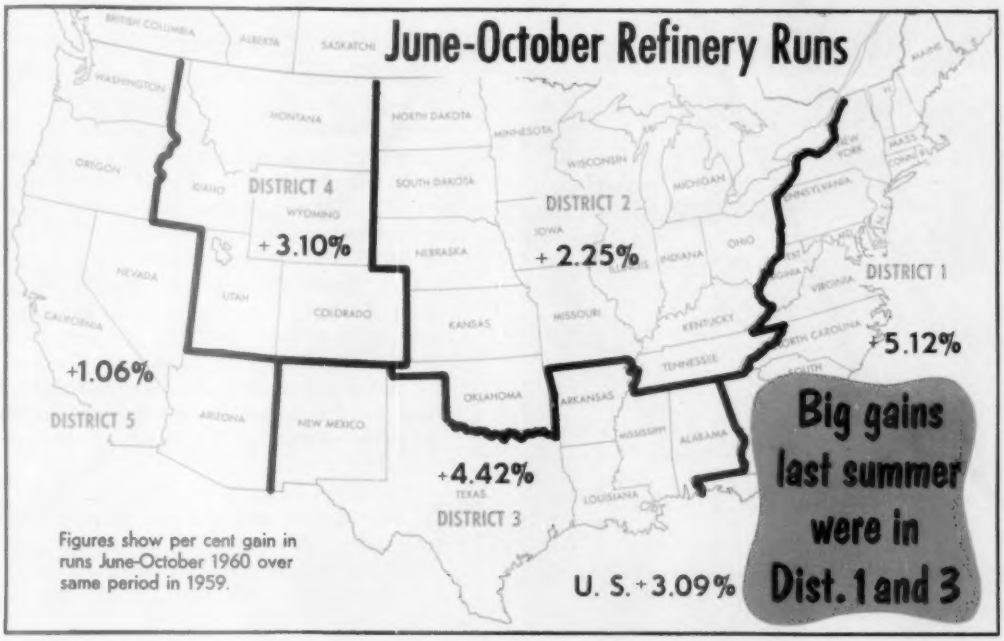
Reduced operations in the late months of the year resulted in reasonable stock withdrawals in November and December. Four-product stocks at the end of the year showed a slight reduction from the total at the end of 1959. But gasoline inventories gained about 8,000,000 bbl. during the year, leaving this product in a vulnerable price position. Cold weather and high runs in the first quarter of 1961 can put pressure on gasoline prices by the middle of the second quarter. The situation can be corrected by a reduction in gasoline yields in the first quarter.

One of the small tables shows changes in yields since 1937. Gains for gasoline and kerosine in 1960 were offset by reductions in yields of distillate and residual fuels. The jump in kerosine yield can be credited to increased production of commercial jet fuel.

Major-product yields, 1960

(Per Cent of Crude Plus Unfinished Rerun)

	Gasoline	Kerosine	Distillate	Residual
East Coast	42.2	2.9	27.5	12.5
Appalachian 1	41.3	3.7	22.3	10.8
Appalachian 2	50.6	5.2	18.5	12.0
Ill., Ind., Ky.	49.2	5.0	21.3	11.1
Minn., Wis., Dak.	45.5	4.2	23.9	14.3
Okla., Kans., Mo.	49.1	2.0	24.6	3.2
Inland Texas	47.3	3.2	16.3	6.7
Texas Gulf	46.5	6.7	25.2	7.6
La. Gulf	46.8	9.1	21.9	6.9
N. La. and Ark.	37.5	5.3	20.1	5.9
New Mexico	41.7	1.5	18.1	10.7
Other Rocky Mtn.	44.6	1.2	22.8	10.9
West Coast	38.9	2.8	15.9	23.5
Total U. S.	45.3	4.6	22.5	11.1



Gas-liquids output 11.75% that of

GAS-LIQUIDS PRODUCTION has had a better growth rate than crude oil over the past 20 years. Back in the early forties, output from natural-gasoline plants accounted for less than 6% of total petroleum production in this country. By 1950, the gas-liquids portion had moved up to better than 8% of the total. It was 11.07% in 1959 and is estimated at 11.75% for 1960.

Growth in production of gas liquids is related to increased production of natural gas. Marketed production of natural gas in 1960 was 4.5 times the total in 1941. For the same period, the growth ratio for gas liquids has been 4.2. For crude it was 1.83.

Growth rates for 1960 showed broader differences than for the longer periods. Marketed production of natural gas was up a little more than 5%. Gas liquids gained 6.5%. Crude production was down almost 0.5%.

Since total imports gained only about 2% in 1960, production at natural-gasoline and cycling plants showed the largest percentage gain in the hydrocarbon field.

Even though gas-liquids production was the leader for the year, the gain rate was not up to the postwar average. For the 15-year period ended 1960, production at natural-gasoline and cycling plants had an average annual increase of 8.0%. Since plant output has topped this rate only once in the past 5 years, gas-liquids production seems to be following a normal growth pattern with decreasing percentage gains but good volumetric increases.

Within the industry itself, a change is taking place. Production figures on these pages show it. There has been a revival of interest on the part of the refiner in gas liquids for use in the production of motor fuel.

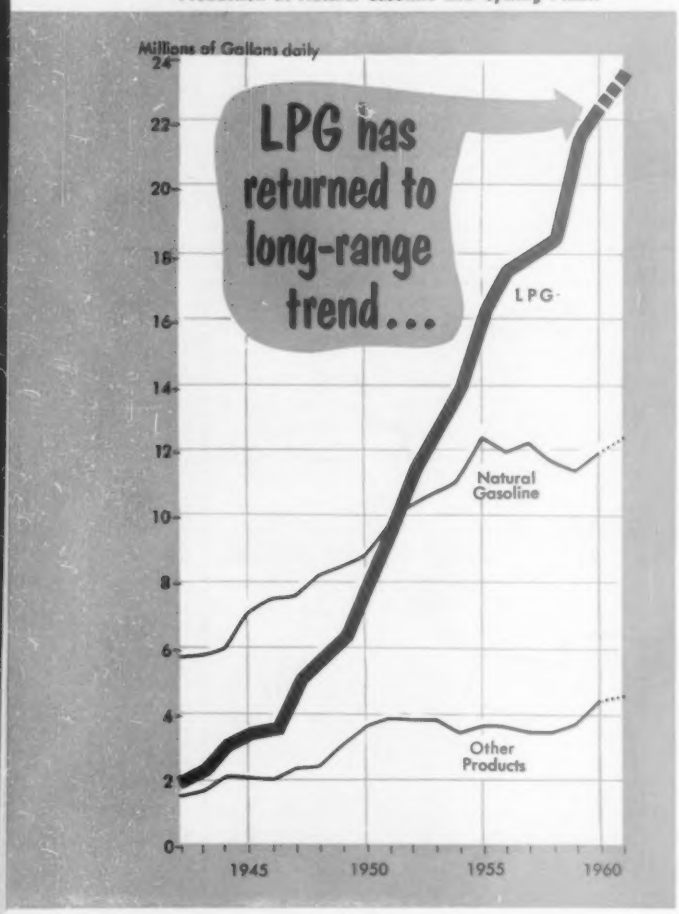
Motorists are demanding a gasoline with a high road-octane number. As a result, refiners are looking for paraffins that can be converted into desirable blending components.

Last year was the first time since the end of World War II that LPG production showed a smaller percentage increase than total output at plants.

Take a look at the tabulation of light-product output by years since the end of the war. The last two columns show percentage gain for LPG and total production. Total output at plants showed a gain of 6.5% for 1960. While this is under the 15-year average, it can be considered normal for recent years. On the other hand, LPG production gained only 5.3%.

Production of natural gasoline showed a gain of 4.7% in 1960, but the increase was calculated on low base production in 1959. The missing LPG did not go into natural gasoline.

Production at Natural-Gasoline and Cycling Plants



Why LPG Percentage Gain Lagged

Detailed figures for the first 10 months of the year give a clue that may answer the question of why LPG showed a smaller percentage gain than the total.

First, it did not go into finished gasoline. For the first 10 months, that product showed a loss of 26% from 1959. The big percentage gain was in production and shipment of condensate. Deliveries of this product were up 79.7% for the January-October period.

Also, some abnormal production figures in the Bureau of Mines reports seemed to indicate a shift in classification of some specialty products from LPG to "Other finished." For example, production of "Finished and other" in Oklahoma was better than 5 million gallons for the month of October. In earlier months when plant production was high, the increase showed up as LPG.

In addition to shifts in product output, there have been new records and changes in positions for individual states. Texas topped 20 million gallons daily in 1960, but it has not been the fastest-growing area. However, the state still accounts for over half of all liquids produced in this country.

total petroleum

These products boast biggest percentage gain in hydrocarbon field

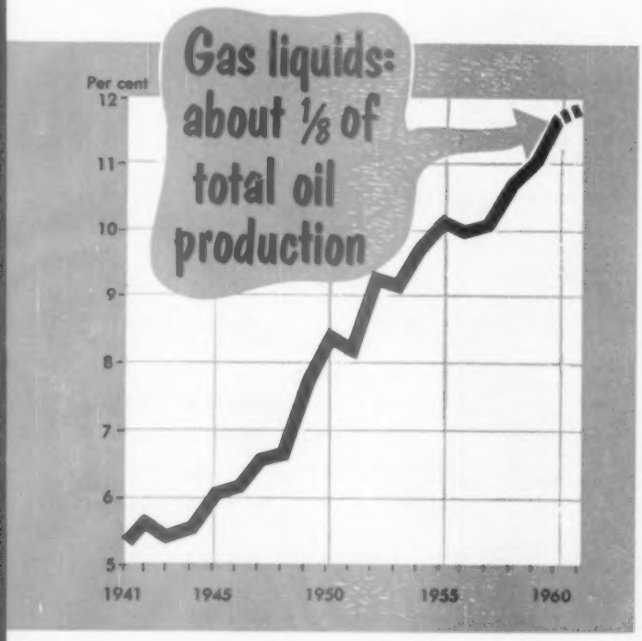
Producers in the Rocky Mountain area have shown good percentage gains since 1955. The area total in 1960 was three times the volume reported in 1955.

Production in the Gulf Coast area of Louisiana has more than doubled in 5 years, and New Mexico's output is almost twice what it was 5 years ago.

The third table gives a breakdown of products by states and a record of states' percentage gains for the year. The largest percentage boost was for the Montana-Utah area with most of the increase supplied by new production in Utah.

Texas accounted for 53% of LPG production in 1960. The state's output of LPG was six times the total reported for Oklahoma, its closest competitor. Texas also produced almost half of the natural gasoline, but Louisiana is the leader in production of other light products. Louisiana's output of "Other" was 2,249,000 gal. daily out of a total of 4,473,000 gal. daily.

The forecast for 1961 calls for a gain in LPG production of 4.8% and 4.0% for total plant output. These may be conservative estimates, considering the increased availability of transportation to the North and reported plans for a pipeline to the southeastern states. The over-all gain may go above 5%.



LIGHT-PRODUCT OUTPUT BY YEARS
(Thousands of gallons daily)

	LP-gas	Natural gasoline‡	Other	Total	Per cent increase: Total	Per cent increase: LPG
1946	3,763	7,472	2,083	13,318	3.3	5.7
1947	5,074	7,627	2,507	15,208	14.2	34.8
1948	5,880	8,295	2,659	16,834	10.7	15.9
1949	6,518	8,388	3,171	18,077	7.4	10.9
1950	8,198	8,963	3,780	20,941	15.8	25.8
1951	9,761	9,832	3,969	23,562	12.5	19.1
1952	11,445	10,277	3,923	25,645	8.8	17.2
1953	12,659	10,769	4,023	27,451	7.0	10.6
1954	14,259	11,248	3,507	29,014	5.7	12.6
1955	16,363	12,214	3,801	32,378	11.6	14.8
1956	17,725	12,128	3,738	33,591	3.7	8.3
1957	18,234	12,327	3,383	33,944	1.1	2.9
1958	18,583	11,932	3,401	33,916	—0.1	1.9
1959	21,574	11,568	3,767	36,909	8.8	16.1
1960*	22,709	12,112	4,473	39,294	6.5	5.3
1961†	23,810	12,450	4,600	40,860	4.0	4.8

*Ten months actual, two months estimated. †Forecast. ‡Isopentane included with natural gasoline, starting with 1945.

PRODUCT OUTPUT AT PLANTS—1960*
(Thousands of gallons daily)

	LP-gas	Natural gasoline	Other	Total	Per cent increase
West Pennsylvania	4	4		8	—33.3
West Virginia	949	81		1,030	11.4
Illinois	976	42	3	1,021	2.7
Kansas	375	313	2	690	8.2
Ky.-Mich.	635	87	1	723	5.0
Neb.-N. Dak.	222	66		288	— 1.2
Oklahoma	1,988	1,333	27	3,348	8.7
Arkansas	206	93	5	304	15.0
Louisiana	1,631	898	2,249	4,778	25.8
Gulf	951	592	1,557	3,100	50.6
Inland	680	306	692	1,678	— 3.5
Mississippi	27	57	9	93	8.3
New Mexico	1,742	686	44	2,472	10.5
Texas	12,037	6,029	1,949	20,015	2.3
Gulf	2,339	1,591	809	4,739	7.3
West	4,737	1,836	20	6,593	0.5
East	401	239	4	644	— 7.7
Panhandle	2,095	1,141	20	3,256	— 0.5
Other	2,465	1,222	1,096	4,783	3.5
Colorado	264	196		460	34.3
Montana-Utah	243	66		309	65.7
Wyoming	282	229	13	524	23.5
West Coast	1,128	1,932	171	3,231	— 4.2
Total U. S.	**22,709**	**12,112**	**4,473**	**39,294**	**6.5**

*Ten months actual, two months estimated.

LIGHT-PRODUCTS OUTPUT BY STATES
(Thousands of gallons daily)

	1955	1956	1957	1958	1959	1960*
Appalachian	899	770	741	730	937	1,038
Illinois	961	1,025	1,070	1,038	994	1,021
Ky.-Mich.	614	777	578	517	†688	†723
Kansas	580	534	610	618	638	690
Oklahoma	2,784	2,920	2,871	3,008	3,080	3,348
Neb.-N. Dak.	130	200	213	241	‡292	‡288
Arkansas	286	266	257	249	264	304
Louisiana	2,940	2,947	3,041	3,271	3,798	4,778
Gulf	1,386	1,582	1,607	1,932	2,059	3,100
Inland	1,554	1,365	1,434	1,339	1,739	1,678
Mississippi	97	97	96	96	86	93
New Mexico	1,478	1,684	1,877	1,962	2,237	2,472
Texas	17,640	18,294	18,565	18,242	19,571	20,015
Gulf	3,885	3,942	4,155	4,035	4,417	4,739
West	5,737	5,987	6,278	6,078	6,562	6,593
East	1,197	972	883	676	698	644
Panhandle	2,591	2,716	2,741	2,765	3,272	3,256
Other	4,230	4,677	4,508	4,688	4,622	4,783
Rocky Mtn.	433	560	644	667	953	1,293
California	3,536	3,517	3,381	3,277	3,371	3,231
Total U. S.	**32,378**	**33,591**	**33,944**	**33,916**	**36,909**	**39,294**

*Ten months actual, two months estimated. †Includes Michigan. ‡Includes North Dakota.

World output gains 7.2% in 1960

Middle East, Africa, Canada, Venezuela share in increases

THE CENTER OF GRAVITY of the Free World's crude-producing industry shifted farther toward the Eastern Hemisphere last year as the Middle East accounted for the lion's share of a gain of more than 900,000 bbl. daily in Free World areas outside the United States.

Middle East fields produced 14% more oil last year with a rise of about 643,800 bbl. daily. This amounted to 69% of the over-all foreign gain of about 930,800 bbl. daily.

North Africa, with a fivefold increase in output from the French Sahara, also won a significant share of the new markets for oil by supplying nearly 17% of the world-wide increment.

Several Western Hemisphere producers showed gains, but on a much smaller scale. Venezuelan output, up about 2.1%, accounted for a modest 6% of the added production, while the rise in Canadian output was equal to about 2.5% of the over-all gain.

Argentina's fast-moving development program is already making itself felt. Its 30% gain in crude output was equal to 4% of the new foreign supplies.

Middle East passes 5¼ million barrels daily

Country—	Production (1,000 bbl. daily 1960)	Per cent change	Est. crude oil reserves (mill. of bbl.)	Ref. Capac. thou. of BPSD
Western Hemisphere				
Argentina	160.0	30.6	2,200.0	237.5
Bolivia	8.3	− 4.5	95.0	11.2
Brazil	77.0	20.8	300.0	208.1
Canada	530.1	4.7	5,000.0	1,002.3
Chile	19.8	12.5	110.0	48.0
Colombia	151.0	2.9	750.0	78.2
Cuba	0.2	− 66.8	1.8	86.9
Ecuador	7.6		30.0	13.2
Mexico	275.0	4.1	2,250.0	393.0
N.W.I.				680.0
Peru	52.0	7.0	375.0	48.6
Puerto Rico				95.2
Trinidad	116.0	3.5	450.0	295.0
Uruguay				28.0
Venezuela	2,830.0	2.1	18,500.0	961.8
Total	**4,227.0**		**30,061.8**	**4,187.0**
Middle East				
Turkey	7.4		75.0	7.0
Aden				120.0
Bahrain	45.1		250.0	186.5
Iran	1,050.0	11.2	35,000.0	495.0
Iraq	970.0	13.9	27,000.0	76.3
Israel	2.7	8.0	35.0	87.0
Kuwait	1,625.0	17.4	62,000.0	220.0
Lebanon				24.0
Neutral Zone	132.0	13.5	6,000.0	50.0
Qatar	172.7	2.6	2,500.0	0.6
Saudi Arabia	1,247.0	13.8	50,000.0	189.0
Southern Arabia			250.0	120.0
Syria			50.0	20.0
Total	**5,251.9**		**183,160.0**	**1,595.4**
Africa				
Algeria (incl. Sahara)	174.0	522.0	5,200.0	
Angola	1.3	30.0	30.0	2.2
Egypt	62.0	6.2	550.0	93.2
Gabon	15.6	8.3	150.0	
Libya			2,000.0	
Morocco	2.0		9.5	2.1
Moyen Congo	1.0	100.0	10.0	
Nigeria	20.0	82.0	150.0	
South Africa				25.0
Total	**275.9**		**8,099.5**	**122.5**

Country—	Production (1,000 bbl. daily 1960)	Per cent change	Est. crude oil reserves (mill. of bbl.)	Ref. Capac. thou. of BPSD
Europe				
Austria	46.4		275.0	46.6
Belgium				161.5
Finland				25.0
France	39.0	21.9	225.0	842.7
W. Germany	106.0	4.6	500.0	846.2
Greece				30.0
Italy (incl. Sicily)	37.0	16.7	320.0	818.6
Ireland				40.0
Netherlands	36.0	6.2	250.0	459.0
Norway				2.2
Portugal				22.9
Spain				146.0
Sweden				60.9
U. K.	1.7		5.0	949.3
Yugoslavia	22.0	91.4	147.0	25.2
Total	**288.1**		**1,722.0**	**4,476.1**
Asia-Pacific				
Australia			1.0	241.0
British Borneo	96.0	− 12.6	500.0	46.0
Burma	10.9		45.0	11.1
Formosa	0.1		0.5	28.0
India	8.4	− 9.7	750.0	116.1
Indonesia	425.0	11.6	9,500.0	273.8
Japan	9.5	21.8	60.0	683.7
New Guinea	4.5		25.0	
Pakistan	7.6	18.8	25.0	6.0
Philippines				26.0
Total	**562.0**		**10,906.5**	**1,431.7**
Total non-Communist countries, less U. S.	**10,604.9**		**233,949.8**	**11,812.7**
United States	**7,032.0**	**− 0.3**	**33,535.0**	**10,400.0**
Total Free World	**17,636.9**		**267,484.8**	**22,212.7**
USSR & Red Bloc areas	**3,230.0**	**10.0**	**33,502.0**	
Total world	**20,866.9**		**300,986.8**	

Prices show strong signs of revival

PRICES of crude oil and most petroleum products generally took on that upward look in 1960. This reversed a 2-year downtrend that has prevailed since the Suez crisis.

Making the upturn were prices of crude, gasolines, and No. 6 residual. Kerosine gained in the Mid-Continent but lost ground slightly on the Gulf Coast while No. 2 distillates dropped in both areas.

These improvements in prices reflected increased attention to management of production, refinery runs, and stocks by state regulatory agencies and companies themselves.

Trends dominating the oil markets are best exemplified in what happened to crude. Average U. S. crude price in 1960 was $2.92 a barrel, up only 2 cents from the 1959 level. But this gain was significant. It reversed the price slide experienced in 1958 and 1959, and the price was the highest average in the last 11 years except for the 1957-58 Suez period.

Gasoline also improved in price as the year went along.

Regular gasoline in Group 3 started the year with a spot price of 9.93 to 10.12 cents per gallon and advanced steadily to 12.25-50 cents in December. The Gulf Coast prices for regular made a less spectacular advance but still moved from 10.50-75 cents per gallon in January to 11.25-50 in December.

No. 6 residual also advanced across the board. In Group 3, it ranged from $1.80 to $1.90 in January but by July had firmed at $1.90 and held there the rest of the year. On the Gulf Coast, residual started off at $2, jumped to $2.35 in August, and held at $2.30 the rest of the year.

No. 2 distillate was 9.44 cents per gallon in Group 3 in January and 8.50 on the Gulf Coast. After dropping during the off-season, prices were heading back up in December at 9.31-38 cents in Group 3 and 8.38 on the Gulf.

Kerosine had its ups and downs. In Group 3 the spot price was 10.44-69 cents in January. After a first-half weakness, it firmed and moved up to 10.69-75 by the end of the year. On the Gulf Coast, the price trend for kerosine was down most of the year—from 9.50 cents in January to 9.13 in December.

Representative Product Prices

Spot-Market Quotations of Leading Suppliers
(Cents per gallon except dollars per barrel for residual)

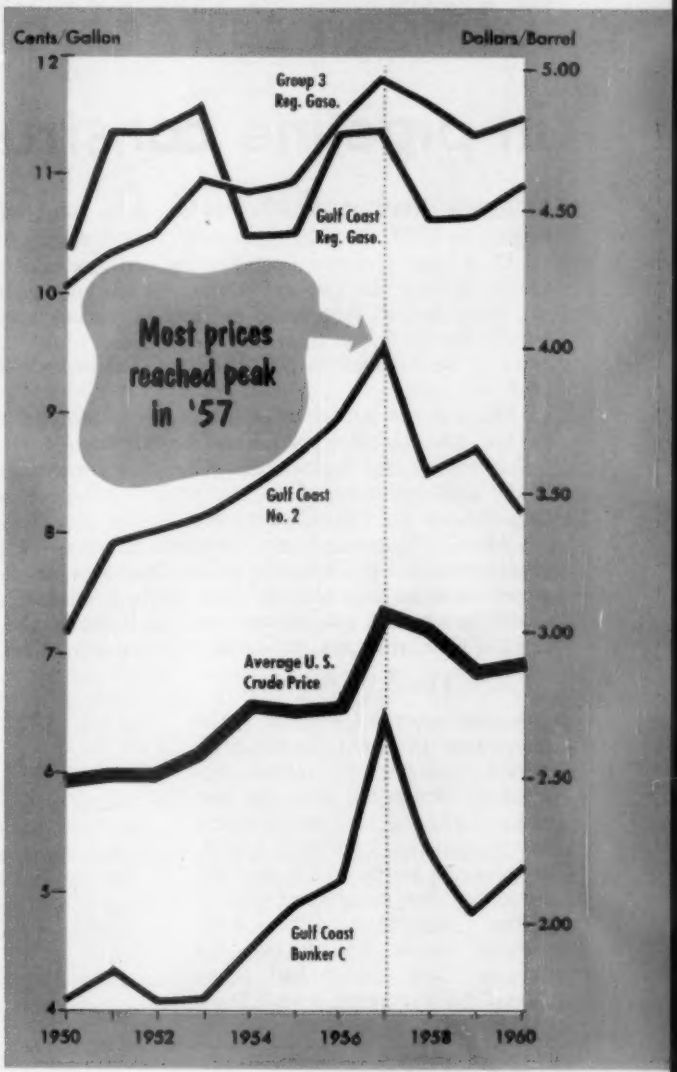
GROUP 3

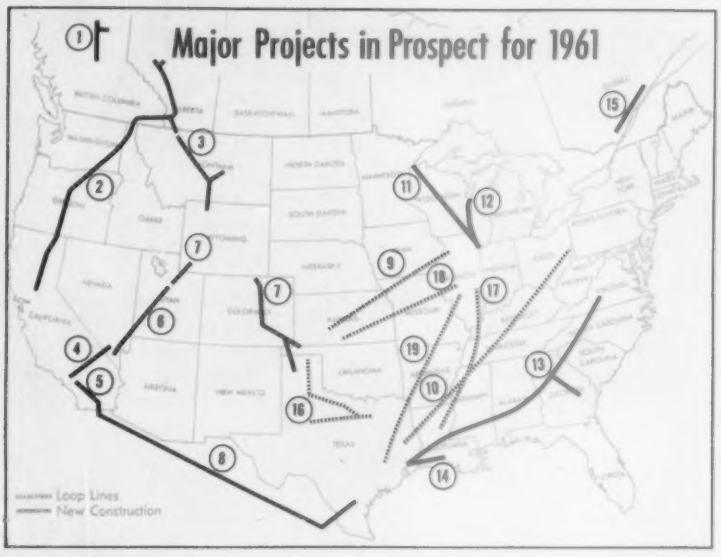
1960—	Regular gasoline	Kerosine	No. 2 distillate	No. 6 residual
January	9.93-10.12	10.44-10.69	9.44-9.44	1.80-1.90
February	10-15-10.45	9.90-10.15	8.90-9.05	1.76-1.86
March	10.81-11.06	9.38- 9.63	8.25-8.38	1.70-1.80
April	10.94-11.38	9.06- 9.50	7.81-8.25	1.70-1.80
May	10.45-10.70	9.00- 9.50	7.75-8.25	1.70-1.80
June	11.25-11.31	8.97- 9.22	7.69-7.94	1.78-1.83
July	11.75-11.88	9.25- 9.31	7.94-8.00	1.90-1.90
August	12.05-12.30	9.78-10.03	8.45-8.70	1.90-1.90
September	12.25-12.50	10.13-10.38	8.75-9.00	1.90-1.90
October	12.25-12.50	10.18-10.38	8.80-9.00	1.90-1.90
November	12.25-12.50	10.38-10.38	9.00-9.00	1.90-1.90
December	12.25-12.50	10.69-10.75	9.31-9.38	1.90-1.90

GULF COAST

1960—				
January	10.50-10.75	9.50-9.50	8.50-8.50	2.00-2.00
February	10.50-10.75	9.30-9.40	8.28-8.35	2.00-2.00
March	10.50-10.75	8.81-9.00	7.81-8.00	2.00-2.00
April	10.50-10.75	8.66-9.00	7.66-8.00	2.10-2.19
May	10.25-10.50	8.73-9.00	7.73-8.00	2.10-2.25
June	10.50-10.75	8.97-9.00	7.97-8.00	2.10-2.25
July	10.69-10.88	9.00-9.13	8.19-8.19	2.24-2.28
August	11.20-11.25	9.00-9.25	8.25-8.30	2.35-2.35
September	11.25-11.25	9.00-9.25	8.25-8.25	2.33-2.33
October	11.25-11.25	9.00-9.25	8.25-8.25	2.30-2.30
November	11.25-11.25	9.00-9.25	8.25-8.25	2.30-2.30
December	11.25-11.25	9.13-9.13	8.38-8.38	2.30-2.30

Crude and Product Prices





. . . Key to 1961 projects

Key	Company	Type	Miles/Size
1	Gas Trunkline	Gas	245—30
2	Pacific G & E	Gas	1,296—36/22
3	Glacier	Crude	521—10/3
4	Calnev	Prod.	225— 8/6
5	California Gas	Gas	292—34
6	El Paso	Gas	395—34
7	Colorado Interstate	Gas	352—34/26
8	Tennessee—Pemex	Gas	1,100—34
9	Michigan-Wisconsin	(Project canceled)	
10	Tennessee Gas P.L.	Gas	324—36/30
11	Mid-America	Cond.	405—10
12	West Shore	Prod.	200—16
13	Trans-Southern	LPG	1,353—12/4
14	Texas Eastern	LPG	290—10/4
15	Quebec Gas	Gas	300—
16	Lone Star	Gas	250—var.
17	Trunkline	Gas	223—30/20
18	Panhandle Eastern	Gas	421—30/6
19	Natural Gas P.L.	Gas	347—36/8

'61 seen as record year in pipeline construction

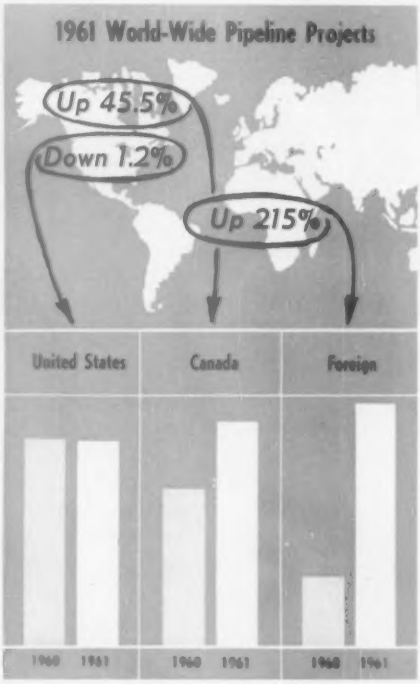
PIPELINE CONSTRUCTION in the Free World will reach record heights in 1961. It could approach 27,000 miles, 30% above 1960.

U. S. and Canadian construction will increase moderately. But Latin America, Europe, and Africa will see huge gains.

There are 40 large-scale projects in various stages for countries outside the U. S. and Canada. They exceed 15,000 miles. Many will certainly be deferred so that 1961 foreign construction will be closer to 8,500 miles.

Major North American project is the 1,400-mile Alberta-California gas line. The Canadian portion and the Gas Trunk Line project in British Columbia are two reasons why Canadian construction will increase. With 1,200 miles of 36-in., the former will be the largest-diameter long-distance gas-transmission line.

When FPC approved the Colorado Interstate-El Paso proposal to supply more gas to California in late December, another major project moved closer to construction. This, or the 1,100-mile, 34-in. Tennessee Gas-Pemex project via Mexico, will probably be the next major line to serve California, now the fastest growing market for gas.



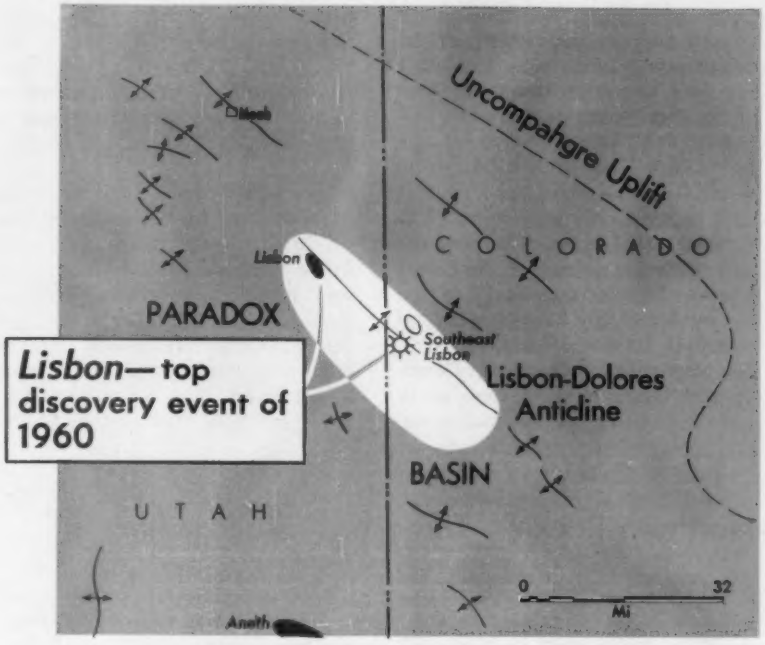
LPG Lines Cop Headlines

A significant development is the emergence of LPG lines. Mid-America's 2,200-mile system, finished in December, was the first major LPG line. Trans-Southern has proposed a 1,350-mile system to serve the Southeast. It was followed by the counterproposal of several companies. Other LPG projects up to 300 miles are planned. Last year a half dozen short LPG lines were built. There will probably be as many or more in 1961.

U. S. PIPELINE CONSTRUCTION—DIAMETER AND LENGTH

Size (in.)	1960 Gas	1960 Oil	1960 Tot. mi.	1961 Gas	1961 Oil	1961 Tot. mi.
4-10	3,050	5,060	8,110	2,750	4,150	6,900
12	500	....	500	600	250	850
16	750	150	900	600	200	800
20	900	....	900	900	....	900
24	2,600	....	2,600	2,200	....	2,200
30	3,000	....	3,000	2,750	....	2,750
34	150	....	150	600	....	600
36	350	....	350	1,350	....	1,350
Misc.	400	60	460	450	....	450
	11,700	5,300	17,000	12,200	4,600	16,800

The first year of the '60's saw a decline in wildcatting in all but a few of the map's corners. Discoveries were lean in most areas, bold exploring didn't pan out everywhere, but . . .



Lisbon— top discovery event of 1960

1960 oil hunting good in spots

. . . and among these were

Utah's Lisbon field, which tapped a new Paradox basin horizon

MOST AGREE that Utah's Lisbon field is one of the major discoveries in the Rockies for 1960. Indeed, it is the most significant oil and gas find in the Paradox basin since Aneth itself. Although there are only a few official completions in the field since its discovery more than 1 year ago, these important facts remain:

- Devonian production at Lisbon tapped a new horizon for the Paradox basin.
- The tremendous worth of the Mississippian was once more proved—its value having declined since the Big Flat discovery in 1957.
- One of the five major salt anticlines coming off the flank of the Uncompahgre uplift now has production. The Lisbon-Dolores anticline discoveries at both Lisbon and Southeast Lisbon across the Colorado line set the stage for a new era of Paradox exploration.

Despite these important facts, the value of Lisbon as a big producer remains to be seen. Much development work remains. Vertical extent of the field's pay zones is considered more significant than the areal extent. Even if there are few wells proved commercial, production should be substantial and lengthy.

Few tests. Fewer than 20 Devonian wildcats had been drilled in the Paradox basin before Lisbon. With the opening of Aneth most explorers looked for Pennsylvanian oil in the basin. The Big Flat Mississippian discovery stirred exploration for a short while in the northern part of the basin, but Lisbon's success brought reality to that section's potential.

Pure Oil Co. completed the Lisbon discovery well officially early in January 1960. Location is on the southwest flank and at north end of the southernmost of five major salt anticlines southwest of Uncompahgre uplift. Pure completed the discovery flowing 587 bbl. of oil daily through 14/64-in. choke from Devonian perforations at 8,261-8,348 ft. The well also flowed 17.5 million cubic feet of gas daily from Mississippian. Then Elliott Production Co. 1 Lisbon Valley-C was completed flowing 272 bbl. of oil and 686 M.c.f.d. through 16/64-in choke in the Mississippian at 8,767-8,830 ft. Subsequent wells have found most of their production in Mississippian. Indications are that the Mississippian, rather than Devonian, thus far offers the best potential at Lisbon. All wells in the field have either been completed in or have indicated commercial Missis-

sipian production. Log and sample reports support the fact that the Mississippian limestone offers better reservoir characteristics than those of the McCracken sandstone of Devonian age. Actual reserve figures, however, are not yet available from either zone.

Southeast Lisbon. The opposite and southeastern end of the long Lisbon - Dolores anticline is also busy developing Mississippian gas potential. Pure opened this field in San Miguel County last year. Development has been slow here as at Lisbon, but the gas potential in the Mississippian appears to be good. Belco Petroleum Co. opened another field southwest of Southeast Lisbon with gas from Mississippian to add further caliber to this end of the play.

The future. Lisbon and Southeast Lisbon fields are but a step in new exploratory paths that should open in the northern Paradox basin. The success of these two fields, development of which may take some time, will encourage exploration into the other salt anticlines in this portion of the basin. It is far too early to really tell how great Lisbon is.

Northern Rockies: Three basins show life

EXPLORATORY STEAM in the northern Rockies centered in three Wyoming basins, and in Montana's portion of Williston. The Green River, Wind River, and Powder River basins commanded wildcat interest in Wyoming. The best Devonian discovery yet in Williston featured Montana success.

Wyoming's prize hits. There's more than one reason why Wyoming kept its drilling and exploration lead among Rocky Mountain states in 1960. One of the best of several reasons is the buildup of exploration pressure in the Green River basin. Until 1958 most Green River production was concentrated in extreme western Wyoming and along a line northward through the Baxter basin area and Rock Springs, with other fields scattered along the Colorado border to the south.

This all changed about 2 years ago when exploration broke away from these far-western areas and began to concentrate in the Upper Cretaceous Mesaverde formations over a wide area. The biggest center of such activity is Sweetwater County. Area concerned covers about 12 townships. Mesaverde wildcatting at first turned up large gas reserves. But 1959 and 1960 brought substantial oil discoveries at Patrick Draw, Beacon Ridge, Arch, and West Desert Springs. The well that started all this was El Paso 1 Patrick Draw unit, completed for 637 bbl. of oil daily from Almond Cretaceous Mesaverde sand. Subsequent development has been steady and highly worth while. This southwestern Wyoming region will continue to prosper in 1961.

Wind River. This formidable wildcat barrier gained its biggest oil strike since Grieve Unit. National Cooperative Refinery Association 1 Wallace Creek flowed 1,416 bbl. of oil daily on tests of the Muddy zone of Thermopolis shale of Upper Cretaceous age. Discovery is in a remote area of Natrona County, 8½ miles south of nearest production at Cooper Reservoir. Wallace Creek proved that the Wind River needs more exploring and that the Muddy is still one of Wyoming's biggest producers.

Powder River. Campbell and Crook counties were among the most active areas in the Rockies last year. Big emphasis was put on Muddy Cretaceous development at Rozet field in Campbell County, as yet undefined. Rozet was opened in 1959. It is apparently one of the more important oil finds in Wyoming in years.

Another prime Powder River target has been the push to Minnelusa Pennsylvanian rocks. Several Pennsylvanian discoveries of importance were completed in the northeastern part of the basin. This is the continuation of a trend that began 2 years ago. First Mowry Cretaceous oil was found in Powder River basin last year, opening a new horizon for the drill in this largest of Wyoming's basins.

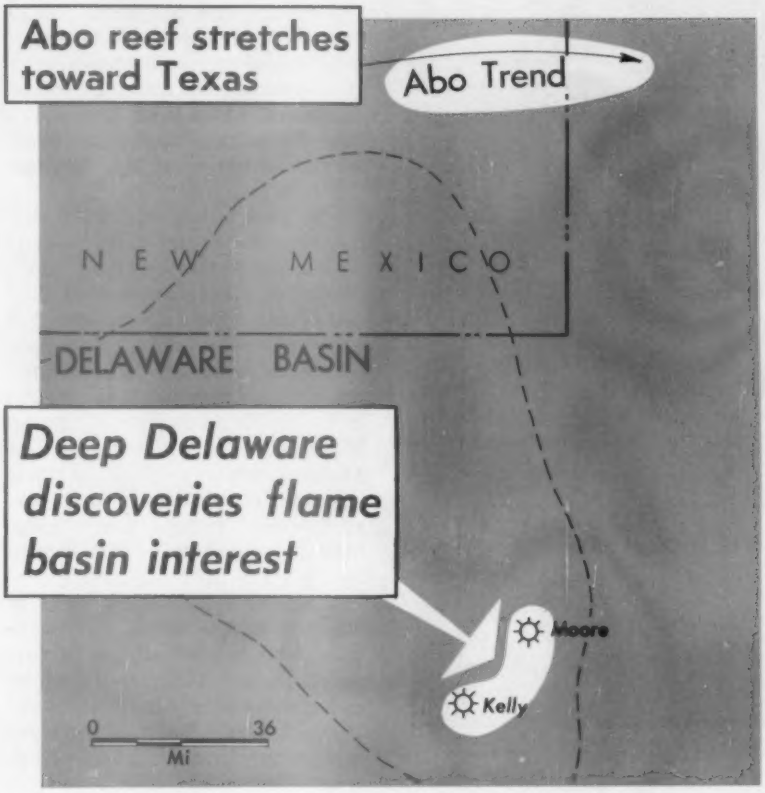
Montana's Devonian. Nearly 10 years of sporadic Devonian exploration in the Williston basin turned up the best find yet in that formation.

Murphy Corp. 1 Sletvold opened Tule Creek field in Roosevelt County, northeastern Montana, flowing 476 bbl. of oil per day through 14/64-in. choke on completion. Perforations were in the Nisku at 7,660-76 and 7,689-92 ft. During tests the well flowed up to 87 bbl. per hour.

Devonian fields in Williston are evenly divided between Montana and North Dakota. There is Devonian oil at Beaver Lodge, McGregor, Sand Creek, and Lost Bridge in North Dakota; in Montana, 1 well each at Southwest Richey, Redstone, Outlook, and Duck Creek. Tule Creek should prove that the Devonian has been forgotten in the past 10 years of large - scale Mississippian exploration throughout the basin.

The future. Wyoming and Montana will likely retain the exploratory-interest lead in this year's campaign. Much is left to be done in both states. Look for a new attack on Montana's Disturbed belt where previous exploration has been scattered and disappointing. All of Wyoming's basins should be in for a good year of wildcatting, particularly Wind River, Powder River, and Green River. Spots to watch in Colorado are the southwestern section and the extreme northeastern and eastern flanks of Denver basin. Nebraska's contribution to drilling success will be in both the Denver and Kaneb basins. North Dakota should be in for another round of deep, central-basin drilling.

"Look for a new attack on Montana's Disturbed belt where previous exploration has been scattered and disappointing. All of Wyoming's basins should be in for a good year of wildcatting, particularly Wind River, Powder River, and Green River."



West Texas: Permian basin empire scores

TWO 1960 DISCOVERIES at great depth once more drew attention to the deep possibilities of the Delaware basin of West Texas and Southeast New Mexico. These two strikes plus the rapid growth of the Abo Permian reef trend up in Lea and Eddy counties returned the Permian-basin empire to the exploratory fold last year. Both events will have much impact on this year's drilling picture.

The deep Delaware. The two important West Texas discoveries, both near the eastern mouth of the Delaware basin in Pecos County, will trigger a new era of "deep search" throughout the region. Both strikes are what basin operators have been waiting for through years of frustrating exploration.

Mobil Oil Co.'s 1 Kathleen Moore is labeled the most important wildcat in Texas in many years. Mobil finished the well in Pennsylvanian at 15,041-15,147 ft. for 102 M.M.c.f.d. and 1,500 bbl. of condensate. It was the only Pennsylvanian producer in the Texas portion of the basin. New Mexico's side of the basin only had four of note at last count.

About 20 miles southwest of the Moore well, another pre-Permian strike was made at Atlantic Refining Co. 1 Kelly. This well became the deepest producer in Texas when it flowed gas at 16,680 ft. in the Montoya Ordovician. Earlier it had 15 M.M.c.f.d. from Devonian at 15,873 ft., making it the deepest producer in West Texas. Nearest Devonian production was at Toyah field 36 miles northwest and at Puckett 48 miles southeast. Montoya production at the Kelly well marks the first such pay in the Delaware basin.

These two discoveries lie on both sides of the ill-fated, thrice-abandoned Gulf Oil Corp. 1 Northrup "A", a deep 18,771-ft. failure in southeastern Reeves County. This well never found the Ellenburger and was finally quit in Siluro-Devonian. Only four other pre-Permian fields have ever been found on the Texas side of the basin, and three of these don't produce—Grisham, Verhalen, and Cable. Toyah is the remaining one. These two new ones will raise the total to a small three.

The Abo. Despite the upswing in Devonian and Pennsylvanian exploratory success in Southeast New Mexico last year, the Abo reef trend has turned Eddy and Lea counties into two of the country's hottest drilling areas.

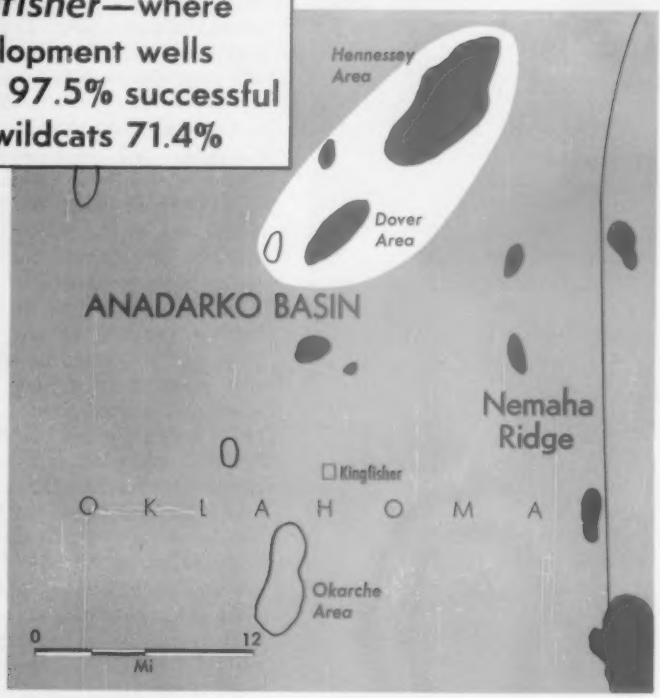
There were at least 40 rigs looking for the reef at one time last year. The reef trend underlies these two counties in a long arc that reaches eastward into Texas. As yet it hasn't crossed the Texas line, but it should soon. It lies along the north edge of the Delaware basin and is located above the Wolfcamp and below the Yeso formations. The initial strike in Abo, oddly enough, was in December 1951 at Lovington field. This discovery stirred no one until it was found in 1958 at Empire in Eddy County about 50 miles west. Then an in-between discovery by Carper at 1-A Federal, 22 miles west of Lovington and 28 miles east of Empire Abo last year fired the feverish drilling pace that has continued until now. Depths run from 4,500 to 8,300 ft. Thickness runs from 850 ft. at Empire to 1,000 ft. in Lovington. Reserves range from 10,000 bbl. per acre at Empire to 25,000 bbl. per acre or more in Lovington. One of the year's biggest new additions was at Vacuum Edge Unit.

Kingfisher: Busiest spot in Mid-Continent

CENTRAL OKLAHOMA's Kingfisher County is the busiest single-county area in the entire Mid-Continent region. Early in 1960 this county of wheat fields was predicted to become a hot spot for oil exploration. This forecast not only came true, but explorers came up with one of those success ratios that drillers dream about . . . almost 100% for field-well development drilling, and more than 75% for wildcatting.

Short history. Kingfisher was an "oil nobody" until 1959 except for the lopover of West Edmond field in the southeast corner of the coun-

Kingfisher—where development wells were 97.5% successful and wildcats 71.4%



ty. In the past 18 months the number of oil and gas fields rose to 22, 16 of them opened last year alone.

Mississippian Manning, Meramec, and Mississippian lime are the prime targets in this fast-moving, highly successful Kingfisher boom. The Manning and Meramec have become one of Soonerland's top producing horizons as a result of the tremendous success in the county. Producing depths range from 6,778 for the Manning, 6,626-42 ft. in the Red Fork Pennsylvanian, 7,016 in the Mississippi lime, 6,787-6,815 ft. in the Oswego lime, and 7,020-90 ft. in the Meramec.

Principal fields. The fastest-growing sections in this Mississippian play are in the East Hennessey area in the northern part of the county. Other active spots include Southeast Lincoln, the Dover fields, and southwest of the town of Kingfisher. Typical North Dover field wells, like Humble 1 Crossley, flowed up to 1,188 bbl. per day from just the Manning. Some wells in the East Hennessey field have combined daily potentials over 2,500 bbl. from two to three zones in the Mississippian pays.

Advanced completion and drilling practices have been the answer to Kingfisher's oil dreams. Companies looked over this area many years ago but found nothing because of tight zones and old drilling practices. Modern methods have changed all this. The once-tight Mississippian is now one of the country's biggest producers. Many of Kingfisher's new discoveries have come about through redrilling of old, forgotten dry holes.

The play is now splashing over the northern border of the county into neighboring Garfield where Marion Oil Co. has recently opened two prolific Mississippian fields just north and east of the East Hennessey area. Indications are that the Kingfisher trend might well swing around in an arc to tie in with Ringwood Manning field in Major County. The Manning appears to be a huge stratigraphic trap that swings south parallel to the Nemaha granite ridge from Ringwood in a hook-shaped line.

Kingfisher's big oil success in recent months is indeed a credit to those who believe oil lies in forgotten places. There seems to be no end in sight for this drilling spree. The lack of dry holes in the campaign, countywide, is almost unheard of in oildom. The impressive acreage spread and a lot of land yet to drill will keep the area's many operators busy into this year and beyond.

Alaska: Best oil-finding year yet

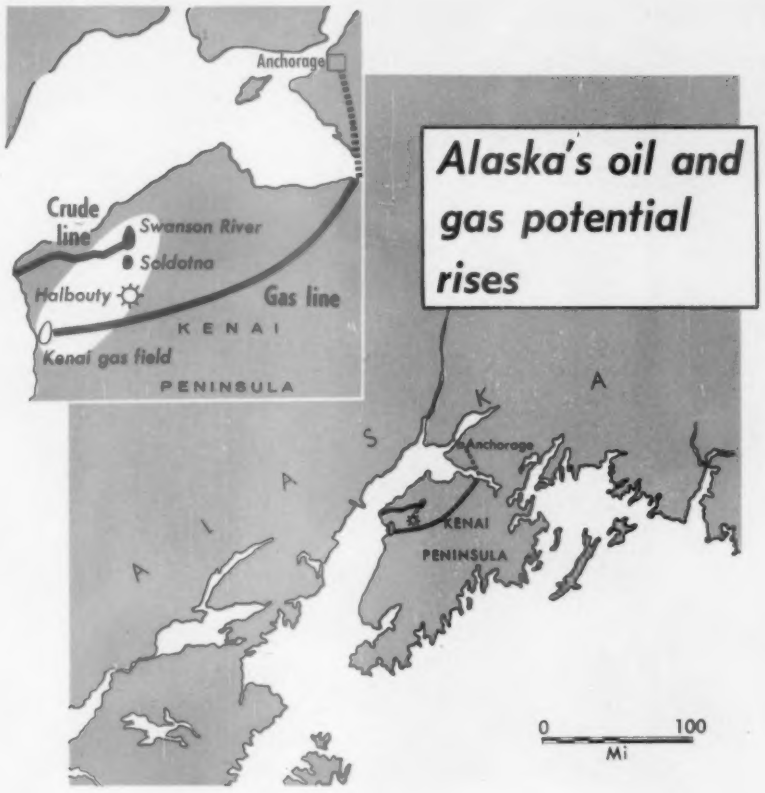
THE BEST oil-finding year yet for Alaska was 1960. Swanson River field began to grow into a reserve of major importance, Soldotna Creek field was opened just south, promising gas reserves were tapped at Kenai field, and Michel T. Halbouty field found prolific gas production at Alaska 1B, 6 miles due south of Soldotna.

These oil and gas developments plus widespread geophysical and geological exploration throughout the state set the stage for Alaska's entry into the oil world.

Swanson River grows. Standard Oil Co. of California and Richfield Oil Corp. completed more oil wells in Swanson River and Soldotna fields in 1960. About 5,000 bbl. per day was flowing through the newly completed crude-oil line to the Nikiski marine terminal at year's end. Since the discovery at Swanson River 11 wells have been successfully completed in the field.

The Soldotna discovery early in the year was the best find yet in Alaska. Standard Oil-Richfield 41-4 Soldotna Creek unit flowed 1,870 bbl. of oil daily on ½-in. choke from Eocene-Hemlock sand at 10,228-10,585 ft. This discovery broke the lull in Alaska oil success that followed the initial Swanson River find. The two companies hold 92% of the 72,000-acre unit which adjoins Swanson River on the south. Sharing the 71,000-acre Swanson River unit with Standard Oil of California and Richfield are Union Oil Co. of California and Ohio Oil Co. The field has six producers.

The first gas producer at Swanson River was finished in June at 32-10 SRU. The well went to 12,029 ft. in regular Hemlock pay, but found



in southeastern Alaska. They are now drilling a second well in the Yakataga basin area.

Geological field parties were busy in unexplored regions of Alaska. The Kandik region, the Arctic Slope, Kenai Peninsula, the Ruby area, Fort Yukon basin, Copper River basin, the Mount McKinley area, Fort Yukon-Kandick region, Brooks Range, Alaska Peninsula, and Tuxedni Bay all saw action last year.

The future bright. Exploratory and development drilling in Alaska in 1960 was a drop in the bucket compared to what lies ahead in this big region. This summer should see an even more active drilling spree than last. Development should continue strong on the Kenai Peninsula now that outlets are available. Both exploration drilling and geological work will spread through the interior basins. Alaska is still a frontier for oil. Many wells will be drilled and much money spent before this producing hinterland comes of age.

no oil there. Operators then plugged back and completed at 3,950 ft. for gas. This gas is used to fuel pumping stations along the pipeline to the Nikiski terminal on Cook Inlet.

Kenai gas field. There are three gas producers in this gas field owned by Union Oil Co. of California and Ohio Oil Co. Production is at about 5,000 ft. They will soon be connected to Anchorage via Alaska's first natural-gas pipeline now under construction. Operations under Turnagain Arm have proved difficult and work has stopped until this spring.

Exploration throughout Alaska during the past drilling season was brisk. Important wildcats were drilled in several areas. Halbouty's second wildcat in the state, the 1 Bishop Creek unit 11-11, was plugged last fall at 9,034 ft. Benedum & Associates 1 Nulato, the first Alaska interior test, went to 12,015 ft. This important wildcat failure was drilled in the Kateel-Koyukuk basin in the west-central part of the state. Richfield went to 14,699 ft. at its 1 Kaliakh dry hole

Deep Edwards takes on new luster

RECENT developments are revealing new potentialities in exploration of the deeper coastward phases of the Lower Cretaceous-Edwards horizon through South Texas.

Chief of these are along the projected northeasterly extension of this commonly designated "Deep Edwards" trend from far-southwestern Texas into the upper reaches of the Texas Coastal region.

There, new exploration the past year has uncovered a chain of additional deep Edwards fields, extending production upcoast on the trend more than 50 miles from its previous most northeasterly point.

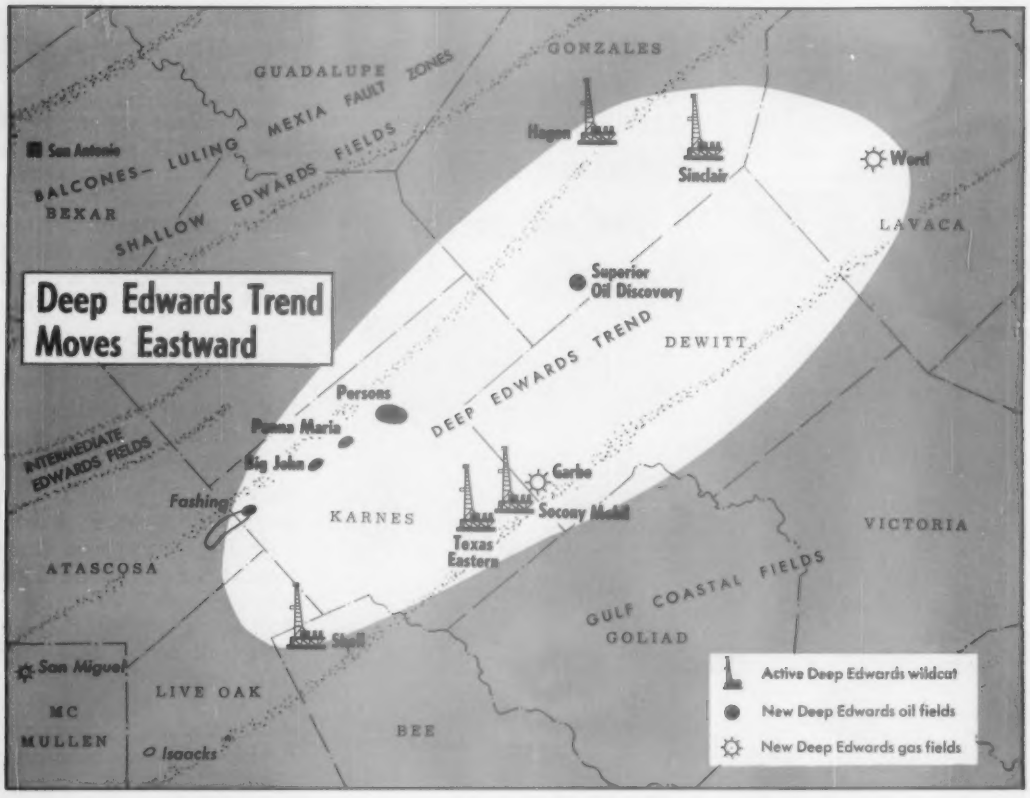
It is significant that most of the newer fields have been oil productive. Previously discovered fields on the trends extending southwestward have been productive only of gas and condensate. In most instances the gas has been sour.

The new developments are greatly enhancing the importance of the Deep Edwards trend as one South Texas leading sources of additional petroleum reserves.

The 50-mile northeastward extension the past year now stretches Edwards production on the trend more than 200 miles from its most southwesterly field at Galan, in far-northwestern Webb County. The line of 23 fields so far discovered follows a so-far relatively narrow band northeasterly across northern Webb County, through LaSalle, McMullen, northwestern Live Oak, southern Atascosa, northern Karnes, DeWitt, and southern Gonzales counties, into Lavaca County.

Most northeasterly production now is in the Word area, southwest of Halletsville, where Socony Mobil Oil Co. has a long gas-condensate well, completed last March. Its Edwards pay, at 13,320-14,278 ft. is the second-deepest so far found with location at one of the most coastward locations so far on the trend.

Four other deep Edwards fields



have been found since then in the northeast extension activity. Three of these have been productive of oil and one of gas. Oil discoveries are Panna Maria and Big John, in Karnes County, and the most recent discovery (as yet unnamed) by Superior Oil Co. in southern Gonzales County. Panna Maria was opened by Standard Oil Co. of Texas last September. Bright & Schiff discovered Big John field in November.

The new gas field is at Garbe, just over the Karnes County line, in southwestern DeWitt County. There Texas Eastern Transmisssion Co. has a lone well, completed last November.

Superior's new discovery in southern Gonzales County is the first deep Edwards production in Gonzales County. It is about midway in the 50-mile gap that had separated Socony Mobil's deep extension discovery in Lavaca County from the previous most northeasterly field on the trend.

A focal point of new activity in the northeast extension play has been in the Person area, northern Karnes County, where one of the trend's most important fields so far has been established. Although discovered late in 1959, much of the development has been the past year with more than 35 wells already completed.

It was the discovery of this field as a 20-mile northeasterly extension and first deep Edwards oil production that gave renewed impetus to the play. Most northeasterly field at the time was Fashing field, on the Atascosa-Karnes county line. Then, a prolific gas-condensate area, Fashing, has become productive of oil with the completion of two wells.

East Texas shows bright promise

EAST TEXAS emerges from one of its most rewarding years of exploration as one of the country's most promising regions for development of additional oil and gas reserves.

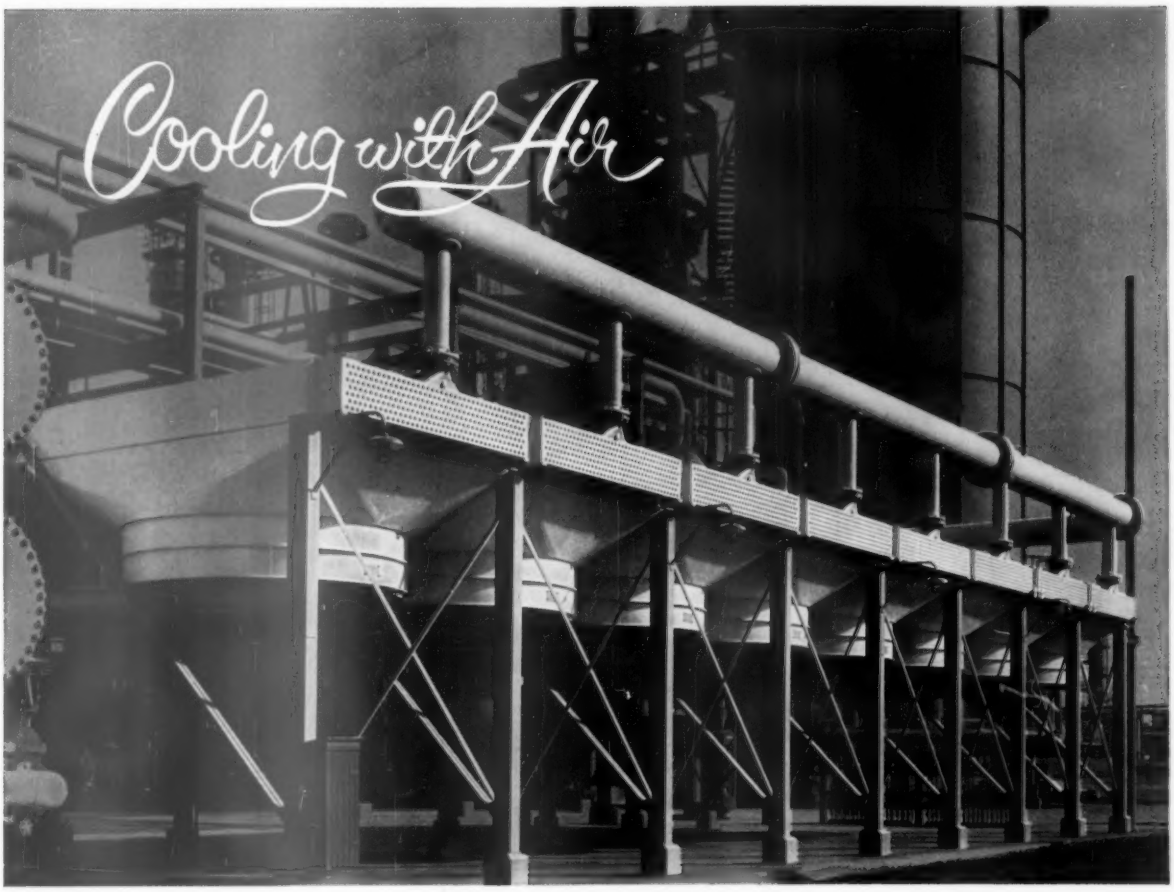
Not only were long strides taken during the year in feeling out the potentialities of the district's newer deeper Jurassic horizons, but also renewed and intensified interest was directed to the younger but still not too widely explored deep Lower Cretaceous horizons.

Added to this was the continued lure of the district's many remaining known salt domes on which no production has been found so far but which always are a potential source of new exploration.

Stepped-up Jurassic exploration, still in its infancy in East Texas, added eight new fields during the year. Six of these were productive from the deeper Smackover formation. Three were productive from the Cotton Valley zone, including one in which the discovery well was dually completed in both zones. Discoveries nearly tripled the number found in any previous year.

Jurassic formations now are productive in 19 East Texas fields. They extend around the Mexia-Talco fault system rimming the basin from the far northeast at the Arkansas line to old Mexia field on the far southwest, a distance of more than 200 miles. Exploration, even since the first Jurassic field was found in 1944, has been spasmodic with elusive results.

Basinward exploration with drilling at greater depths accounted for six of the new Jurassic discoveries of the year. Three of these were in Cass County, on the northeast bor-



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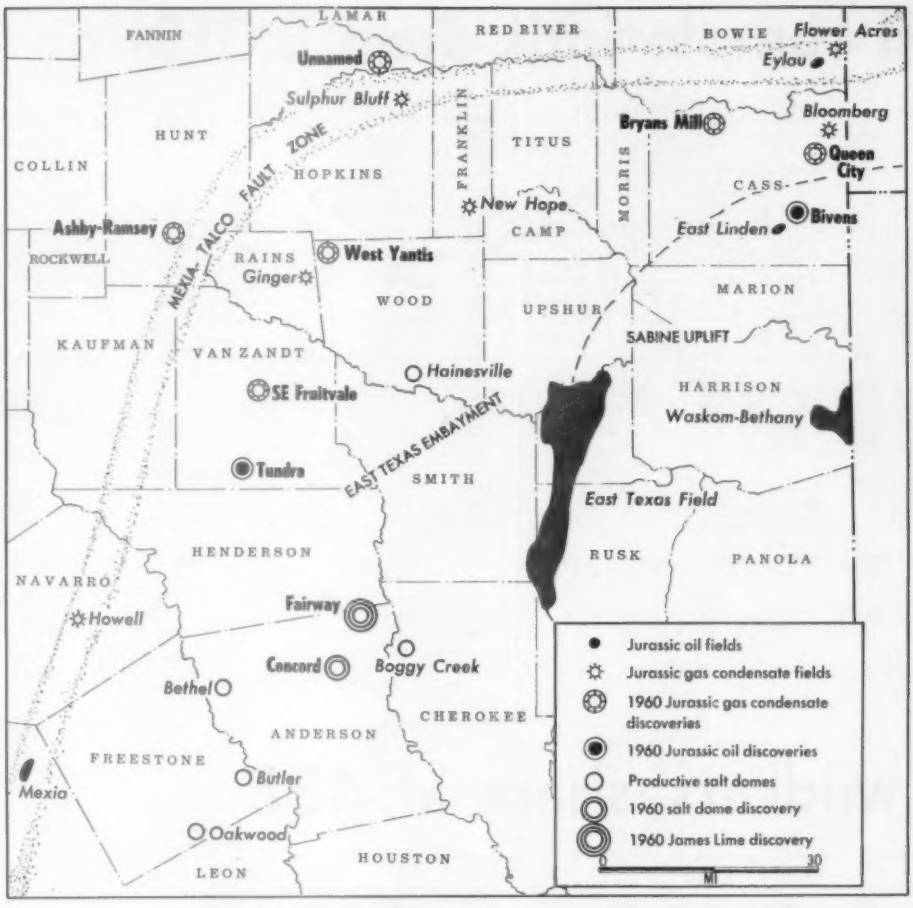

NEW-FIELD DISCOVERIES spread East Texas wildcatting.

dering Arkansas and Louisiana; West Yantis, in northwestern Wood County; and two, Southeast Fruitvale and Tundra, in Van Zandt County.

A Jurassic discovery in Delta County not only was the first production in that county, but extended the play outside the basin's rimming fault system to its most northern point. A discovery along the fault system in Hunt County in the old Ashby-Ramsey shallow area marked the first Jurassic production in that county, on the far northwest side of the basin.

Of the 1960 Jurassic discoveries, only Tundra, in southern Van Zandt County, has been oil productive. All others so far are gas productive. In only two of the new fields have more than the discovery wells been drilled.

So far, on the basis of only three completed gas-condensate wells, Bryans Mill, in northern Cass County, is rated one of the most important of the year's discoveries. It was discovered by Shell Oil Co. and Cities Service Co. as joint operators. Discovery well, completed last March, was productive from the Smackover zone at 10,297-10,367 ft. with an open-flow potential of 22 M.M.c.f. of gas daily, recovery 233 bbl. of condensate per M.M.c.f.

Other Jurassic Discoveries

The two other new Jurassic discoveries in Cass County are at Queen City, opened by Humble Oil & Refining Co. last November with Smackover pay at 10,668-10,714 ft.; and Northeast Linden (Bivins), opened by Sunray Mid-Continent Oil Co. last September with gas-condensate production in the shallower Cotton Valley zone.

Oil production was reopened early in the year on the Concord salt dome, in northern Anderson County. Its discovery well was the only successful wildcat drilled on any of the East Texas basin's 18 known salt domes, but gives East Texas a total of six domes with production. Although salt-dome exploration in East Texas has been disappointing, all salt domes are considered potentially productive and waiting the drill to find the lucky spot.

Concord dome was productive of a small amount of oil in a 1942 discovery, but since then has been abandoned. The new discovery well, drilled by E. O. Meadows, was completed early in the year pumping 345 bbl. of 12.1°-gravity oil daily from Woodbine sand at 4,400 ft. Four additional productive wells were completed during the year.

A new James lime development in northeastern Anderson County and extending into southeastern Henderson County also is giving indication of a major oil-producing area and precipitating another significant play for East Texas.

This is in the Frankston area where Fairway Operating Co. completed a discovery well (1 Wofford) last August flowing 420 bbl. of 47.3°-gravity oil daily with its James lime pay at 9,959-72 ft. The discovery well is 2 miles southwest of a small lone James lime well in southeastern Henderson County. It was completed in 1955 and called Franston field. The new area has been designated as Fairway field. Four additional wells, all good oil producers, have been completed since then. One, 2½ miles west of the discovery well, has been designated for the time being as West Fairway field but is expected to be linked with the first area to form one large producing area. Previously, only a few scattered wells had been completed in the James lime in East Texas, and little had been known of its potentialities.

Total well completions drop 5,013

	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960
Alabama	19	43	50	72	103	63	41	91	78	76	95	45
Arkansas	322	407	429	427	573	665	804	1,002	1,114	836	842	615
California	2,512	1,829	2,361	2,433	2,578	2,353	2,465	2,306	2,238	1,476	1,530	1,709
Colorado	82	99	289	486	734	1,358	1,509	1,222	855	836	809	706
Florida	24	13	2	10	30	31	30	13	9	7	7	5
Illinois	2,711	2,823	2,424	2,149	2,165	3,135	3,892	3,808	2,686	2,419	2,357	2,373
Indiana	1,279	1,534	1,369	1,277	1,280	887	706	741	754	877	880	1,069
Kansas	3,387	4,010	4,501	4,571	4,783	4,722	4,958	4,941	4,232	4,022	3,959	4,288
Kentucky	1,047	1,150	1,309	1,300	1,164	1,188	1,592	1,936	1,495	2,137	3,365	2,180
Louisiana	2,371	2,453	2,240	2,385	2,828	3,611	4,019	3,875	3,856	3,523	3,781	3,707
Michigan	995	897	746	707	623	567	512	437	455	436	656	897
Mississippi	334	313	375	348	397	441	448	441	386	398	645	695
Missouri	....	27	18	18	10	39	1	34	8	6	2	29
Montana	279	270	262	345	451	343	411	495	433	338	348	353
Nebraska	49	171	241	291	320	472	891	918	886	728	910	896
New Mexico	501	607	773	1,053	1,418	1,126	1,663	1,904	2,129	1,910	2,077	1,850
New York	882	657	627	767	696	435	378	512	443	544	259	300
North Dakota	....	3	12	122	270	312	250	263	316	442	436	283
Ohio	1,084	1,027	971	1,052	1,080	1,182	1,259	1,086	1,115	1,049	1,133	1,099
Oklahoma	4,352	5,459	5,626	5,781	7,593	8,786	8,411	8,056	7,421	7,282	6,230	4,802
Pennsylvania	1,920	1,581	1,738	1,884	1,507	1,331	717	748	833	652	648	860
South Dakota	(*)	12	1	14	20	23	16	9	44	15	23	22
Texas	13,665	16,585	16,655	16,845	17,019	18,865	19,981	21,519	21,352	18,065	18,526	15,581
Utah	49	17	39	79	70	91	92	141	267	383	318	243
West Virginia	518	652	622	606	618	614	640	693	680	756	806	884
Wyoming	587	615	745	700	917	1,221	915	930	863	762	990	1,074
Miscellaneous	69	25	91	99	32	69	81	39	76	64	132	186
Total U. S.	39,038	43,279	44,516	45,821	49,279	53,930	56,682	58,160	55,024	50,039	51,764	46,751

*Included in miscellaneous.

. . . with wildcats' share at 438

	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960
Alabama	14	20	21	40	75	56	40	30	28	30	23	7
Arkansas	78	100	99	97	140	157	210	190	25	163	146	145
California	487	450	551	597	666	572	530	527	527	368	402	302
Colorado	48	56	143	245	364	657	811	675	550	485	456	358
Florida	19	10	2	10	30	30	29	13	9	7	7	5
Illinois	724	870	873	656	425	461	635	772	628	449	391	502
Indiana	471	510	559	424	373	224	261	145	155	307	300	366
Kansas	522	816	1,006	845	887	811	1,018	1,073	849	844	1,066	1,056
Kentucky	169	214	293	306	213	173	399	440	310	176	389	223
Louisiana	281	302	379	401	513	570	695	778	679	531	513	552
North	106	136	210	195	177	214	242	265	211	243	244	268
South	175	166	169	206	336	356	453	513	468	288	269	284
Michigan	344	338	332	277	279	243	212	168	152	145	180	246
Mississippi	115	130	174	182	207	178	182	220	194	174	283	267
Montana	45	49	50	98	126	123	172	195	185	136	121	168
Nebraska	18	82	134	168	161	185	415	451	474	348	410	392
New Mexico	74	79	105	165	168	156	158	278	267	266	260	250
North Dakota	....	3	12	36	91	117	69	78	149	135	84	82
Ohio	37	19	35	41	22	22	27	13	15	23	39	55
Oklahoma	804	840	830	730	742	859	832	867	747	854	827	700
Pennsylvania	6	4	10	20	20	46	16	19	18	26	21	20
South Dakota	(*)	12	1	14	20	22	16	9	44	15	10	11
Texas	2,791	3,443	4,408	4,851	5,245	5,190	5,124	5,610	5,004	3,636	3,525	3,166
North Central (9)	475	607	862	1,048	1,058	1,131	975	1,115	1,089	573	573	484
W. Central (7-B)	592	729	1,019	1,035	1,062	971	1,035	1,075	973	699	694	631
West (7-C and 8)	343	669	844	870	876	938	839	898	872	706	747	632
Panhandle (10)	19	24	36	80	26	94	65	125	113	126	108	57
East (5 and 6)	186	223	255	252	300	334	367	431	387	332	252	273
Gulf Coast (2)	450	480	299	336	369	312	344	308	255	196	232	184
Gulf Coast (3)	81	83	363	390	519	526	517	562	440	286	234	218
Southwest (1)	95	98	249	348	432	385	481	498	431	367	329	385
Southwest (4)	550	530	481	492	603	499	501	598	444	351	356	302
Utah	19	13	32	50	42	65	71	86	121	84	101	96
West Virginia	24	43	17	14	23	51	30	27	33	22	29	11
Wyoming	131	122	141	173	189	271	262	289	310	259	375	435
Miscellaneous	73	29	95	112	41	41	57	81	266	105	115	220
Total U. S.	7,294	8,554	10,302	10,552	11,062	11,280	12,271	13,034	11,739	9,588	10,073	9,635

*Included in miscellaneous.

Footage drops 8.86 under 1959

(Thousands of feet)

	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960
Arkansas	1,283	1,342	1,522	1,589	2,111	2,400	2,629	3,005	3,389	2,787	2,865	2,213
California	10,443	7,966	9,566	10,313	11,355	10,923	12,724	10,566	9,786	7,178	7,343	7,447
Colorado	359	409	1,425	2,580	3,830	7,412	8,103	6,232	4,477	4,352	4,235	3,475
Illinois	6,362	6,311	6,044	5,312	5,425	7,613	9,303	8,771	6,198	5,494	5,135	4,823
Indiana	2,357	2,642	2,455	2,255	2,102	1,380	1,103	1,243	1,301	1,406	1,320	1,458
Kansas	10,715	12,744	15,035	15,520	16,217	16,328	17,597	17,103	15,272	14,065	14,160	12,444
Kentucky	1,853	2,076	2,412	2,568	2,355	2,284	2,372	2,748	2,167	2,385	3,520	2,914
Louisiana	12,477	14,554	14,189	15,662	19,125	21,987	26,085	28,438	29,998	27,024	28,896	28,676
North	4,453	4,626	4,741	4,815	4,530	5,923	6,460	6,083	5,285	4,970	5,388	5,369
South	8,024	9,928	9,448	10,847	14,595	16,064	19,625	22,355	24,713	22,054	23,508	23,307
Michigan	2,209	2,118	1,860	1,808	1,603	1,542	1,522	1,262	1,316	1,202	2,004	3,054
Mississippi	2,388	2,258	2,539	2,441	2,750	3,162	3,339	3,193	2,934	3,561	6,076	6,832
Montana	650	621	640	1,257	1,933	1,473	1,928	2,440	2,100	1,732	1,620	1,665
New Mexico	2,419	2,747	3,777	5,833	8,017	6,161	7,046	8,458	9,980	8,869	8,684	9,226
N. Y., Pa., and W. Va.	5,835	5,381	5,800	6,512	5,662	6,691	3,993	4,439	5,026	4,841	4,558	5,087
North Dakota	....	27	65	1,002	1,962	2,246	1,774	1,977	2,157	2,840	2,787	1,807
Ohio	2,286	2,172	2,057	2,295	2,274	2,391	2,642	2,583	2,689	2,708	2,918	2,764
Oklahoma	15,339	19,865	20,542	21,621	26,122	29,463	27,532	27,821	22,782	21,853	21,278	17,432
Texas	57,462	71,975	76,777	82,451	78,645	85,185	85,984	92,620	89,840	74,885	78,142	66,493
N. Central (7-B and 9)	12,831	14,513	16,017	18,688	21,958	22,484	22,982	23,396	21,410	16,964	17,201	13,580
West (7-C and 8)	16,398	26,543	28,233	29,389	20,318	25,144	26,560	28,644	29,549	24,979	27,138	19,949
Panhandle (10)	3,015	2,804	2,307	2,123	2,555	3,211	3,720	5,202	5,639	5,762	5,563	4,679
East (5 and 6)	4,992	4,928	5,603	4,455	4,209	5,590	4,884	5,682	6,685	5,557	5,420	6,069
Gulf Coast (2 and 3)	11,880	13,706	14,328	16,968	16,361	17,245	16,034	17,452	15,846	13,170	13,020	13,232
Southwest (1 and 4)	8,346	9,481	10,289	10,828	13,244	11,511	11,804	12,224	10,711	8,453	9,800	8,984
South Dakota	(*)	30	3	48	103	108	64	48	158	48	175	138
Wyoming	2,803	2,994	3,789	3,529	4,337	6,537	4,484	3,966	3,848	3,599	4,899	5,409
Miscellaneous	763	1,056	1,834	2,594	2,911	3,700	6,046	6,989	7,669	7,395	8,616	7,346
Total U. S.	138,003	159,288	172,331	187,190	198,839	218,986	226,270	233,902	223,087	198,224	209,231	190,703

*Included in miscellaneous.

. . . with average well 13 ft. shallower

(Feet)

	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960
Alabama	4,657	4,368	5,380	5,722	5,257	5,221	4,878	8,789	9,316	8,566	9,972	9,974
Arkansas	3,984	3,296	3,549	3,721	3,684	3,609	3,270	2,997	3,042	3,333	3,402	3,598
California	4,157	4,356	4,052	4,239	4,443	4,642	5,162	4,581	4,373	4,863	4,799	4,358
Colorado	4,378	4,132	4,929	5,309	5,218	5,458	5,370	5,100	5,587	5,205	5,235	4,922
Florida	7,529	5,893	10,047	6,256	6,517	6,406	6,638	6,984	6,403	9,671	8,447	12,066
Illinois	2,347	2,236	2,493	2,472	2,506	2,428	2,390	2,303	2,308	2,271	2,179	2,032
Indiana	1,843	1,722	1,793	1,766	1,642	1,556	1,563	1,678	1,725	1,603	1,497	1,364
Kansas	3,459	3,178	3,340	3,395	3,391	3,458	3,459	3,462	3,609	3,497	3,577	2,902
Kentucky	1,770	1,805	1,842	1,976	2,033	1,922	1,490	1,419	1,450	1,116	1,046	1,337
Louisiana	5,262	5,933	6,334	6,567	6,763	6,064	6,490	7,339	7,779	7,671	7,642	7,736
Michigan	2,220	2,362	2,494	2,557	2,573	2,720	2,973	2,889	2,893	2,758	3,055	3,405
Mississippi	7,150	7,214	6,771	7,013	6,926	7,170	7,453	7,241	7,602	8,946	9,420	9,830
Montana	2,328	2,301	2,443	3,643	4,287	4,295	4,691	4,930	4,851	5,125	4,656	4,718
Nebraska, Missouri	2,240	3,191	4,083	4,447	5,039	5,137	5,603	5,490	5,826	5,883	5,953	5,320
New Mexico	4,828	4,526	4,886	5,539	5,654	5,471	4,237	4,443	4,687	4,644	4,181	4,987
New York	1,434	1,437	1,440	1,369	1,447	1,446	1,460	1,465	1,107	1,533	1,619	1,697
North Dakota	....	9,038	5,425	8,213	7,267	7,200	7,096	7,518	6,827	6,425	6,391	6,382
Ohio	2,110	2,115	2,119	2,181	2,105	2,023	2,098	2,378	2,412	2,582	2,576	2,515
Oklahoma	3,525	3,639	3,651	3,740	3,440	3,553	3,273	3,453	3,463	3,307	3,787	3,630
Pennsylvania	1,605	1,717	1,800	1,971	1,977	3,273	2,534	2,436	3,190	3,011	3,207	2,810
Texas	4,205	4,340	4,601	4,301	4,626	4,516	4,303	4,304	4,207	4,145	4,218	4,268
Utah	5,001	4,069	5,473	6,395	5,653	4,139	4,314	4,893	5,423	5,618	5,464	5,691
West Virginia	2,873	2,643	2,844	2,887	2,710	2,776	2,505	2,694	2,751	2,704	2,557	2,445
Wyoming	4,775	4,869	5,086	5,042	4,730	5,354	4,901	4,265	4,458	4,724	4,948	5,036
Miscellaneous	1,933	3,221	3,035	2,624	2,886	2,966	3,078	4,771	4,470	3,202	3,987	3,017
Total U. S.	3,538	3,680	3,871	4,085	4,035	4,061	3,992	4,022	4,122	4,019	4,092	4,079

Here's the Journal's exclusive

Tally of wells drilled, county by county

ALABAMA
Development Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Serv.	Footage
Choctaw	3	3	0	0	0	0	10,267
Mobile	35	35	0	0	0	0	403,590
Total	38	38	0	0	0	0	413,857

ALABAMA
Wildcat Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Footage
Choctaw	2	0	0	0	2	17,008
Franklin	1	0	0	0	1	871
Lee	1	0	0	0	1	460
Madison	1	0	0	0	1	2,646
Sumpter	2	0	0	0	2	13,824
Winston*	0	0	0	0	0	75
Total	7	0	0	0	7	34,884

*One old well drilled deeper.

ALASKA
Development Completions by Counties

Area—	Total	Crude	Cond.	Gas	Dry	Serv.	Footage
Swanson River	8	5	0	1	1	1	83,053
Soldotna	6	6	0	0	0	0	66,250
Kenai Unit	1	0	0	1	0	0	5,125
Total	15	11	0	2	1	1	154,428

ALASKA
Wildcat Completions by Counties

Area—	Total	Crude	Cond.	Gas	Dry	Footage
Bishop Creek	1	0	0	0	1	9,034
Soldotna	1	1	0	0	0	11,315
Nulato	1	0	0	0	1	12,015
Kaliakh	1	0	0	0	1	14,699
Cook Inlet	1	0	0	1	0	14,019
Knik Arm	2	0	0	0	2	6,228
Dangerous River	1	0	0	0	1	8,634
Total	8	1	0	1	6	75,944

ARIZONA
Development Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Serv.	Footage
Apache	12	2	0	1	9	0	22,082
Total	12	2	0	1	9	0	22,082

ARIZONA
Wildcat Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Footage
Apache	16	1	0	0	15	51,600
Cochise	3	0	0	0	3	7,810
Mohave	1	0	0	0	1	4,015
Navajo	2	0	0	0	2	600
Yavapai	1	0	0	0	1	50
Total	23	1	0	0	22	64,075

ARKANSAS
Development Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Serv.	Footage
Bradley	9	9	0	0	0	0	27,138
Calhoun	25	13	0	0	12	0	71,147
Columbia	25	15	0	0	7	3	101,845
Conway	3	0	0	0	3	0	8,782
Crawford	2	0	0	1	1	0	11,595
Franklin	15	0	0	14	1	0	68,567
Johnson	4	0	0	2	2	0	18,858
Lafayette	100	48	1	0	49	2	423,319
Logan	5	0	0	5	0	0	29,709
Miller	76	39	0	1	36	0	307,063
Nevada	12	7	0	0	5	0	23,170
Ouachita	23	15	0	1	6	1	62,306
Pope	3	0	0	1	2	0	14,862
Sebastian	3	0	0	2	1	0	15,042
Union	165	129	0	0	36	0	465,891
Total	470	275	1	27	161	6	1,649,294

ARKANSAS
Wildcat Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Footage
Boone	1	0	0	0	1	2,393
Bradley	1	1	0	0	0	5,093
Calhoun	10	1	0	0	9	31,599
Columbia	8	0	0	0	8	45,318
Conway	1	0	0	0	1	3,960
Crawford	2	0	0	1	1	9,878
Chrittenden	1	0	0	0	1	3,460
Faulkner	1	0	0	0	1	3,200
Franklin	2	0	0	2	0	7,274
Grant	1	0	0	0	1	2,021
Hempstead	5	0	0	0	5	25,145
Johnson	2	0	0	2	0	9,604
Lafayette	30	4	1	0	25	130,759
Little River	1	0	0	0	1	1,064
Madison	3	0	0	0	3	4,563
Miller	14	1	0	0	13	66,371
Nevada	5	0	0	0	5	12,929
Ouachita	7	1	0	0	6	24,397
Pike	1	0	0	0	1	2,017
Pope	4	0	0	2	2	16,427
Searcy	3	0	0	0	3	1,760
Sebastian	1	0	0	1	0	5,015
Union	37	9	0	1	27	139,814
Van Buren	1	0	0	0	1	3,513
Washington	2	0	0	0	2	1,110
White	1	0	0	0	1	4,511
Total	145	17	1	9	118	563,285

CALIFORNIA
Development Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Serv.	Footage
Colusa	21	0	0	16	5	0	138,192
Contra Costa	1	0	0	0	1	0	3,992
Fresno	130	118	0	1	11	0	516,560
Glenn	9	0	0	1	8	0	38,819
Humboldt	2	0	0	2	0	0	10,192
Kern	696	643	1	5	46	1	2,195,423
Kings	10	1	0	5	4	0	37,142
Los Angeles	171	137	0	0	22	12	903,083
Monterey	34	26	0	1	6	1	73,439
Orange	85	80	0	0	5	0	296,935
Riverside	3	1	0	0	2	0	12,798
San Benito	5	1	0	1	3	0	18,905

1960 DRILLING BY COUNTIES

CALIFORNIA (Continued)

County—	Total	Crude	Cond.	Gas	Dry	Serv.	Footage
San Joaquin	39	0	0	29	10	0	205,454
San Luis Obispo	6	5	0	0	1	0	10,111
San Mateo	12	5	0	0	7	0	29,883
Santa Barbara	*27	21	0	0	6	0	154,710
Sacramento	12	0	0	11	1	0	73,072
Solano	13	0	0	6	7	0	87,155
Sonoma	1	0	0	0	1	0	1,922
Sutter	1	0	0	1	0	0	8,245
Tehama	5	0	0	5	0	0	15,719
Tulare	6	2	0	3	1	0	13,668
Ventura	†117	104	0	0	12	1	850,962
Yolo	1	0	0	0	1	0	3,554
Total	1,407	1,144	1	87	160	15	5,699,935

*Incl. 13 offshore. †Incl. 22 offshore.

CALIFORNIA
Wildcat Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Footage
Amador	1	0	0	0	1	796
Butte	6	0	0	0	6	21,857
Colusa	12	0	0	5	7	77,053
Contra Costa	4	0	0	0	4	21,552
Fresno	7	1	0	0	6	59,005
Glenn	10	0	0	1	9	51,254
Humboldt	3	0	0	2	1	10,682
Kern	54	6	0	2	46	335,320
Kings	11	1	0	1	9	45,143
Los Angeles	14	2	0	0	12	117,269
Madera	2	0	0	1	1	8,330
Modoc	1	0	0	0	1	2,117
Monterey	13	1	0	0	12	31,540
Orange	3	0	0	0	3	16,608
Riverside	5	2	0	0	3	15,359
Sacramento	10	0	0	1	9	61,999
Santa Barbara	14	2	0	0	12	66,733
San Benito	6	0	0	0	6	14,488
San Bernardino	3	0	0	0	3	4,650
Santa Cruz	2	0	0	0	2	3,406
San Joaquin	29	0	0	2	27	171,152
San Luis Obispo	4	0	0	0	4	17,507
San Mateo	4	0	0	0	4	14,722
Shasta	2	0	0	0	2	10,000
Solano	13	0	0	4	9	83,298
Stanislaus	10	0	0	0	10	62,438
Sutter	7	0	0	4	3	45,303
Tehama	14	0	0	2	12	68,049
Tulare	7	0	0	1	6	18,766
Ventura	19	1	0	0	18	210,388
Yolo	12	0	0	1	11	80,705
Total	302	16	0	27	259	1,747,489

COLORADO
Development Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Serv.	Footage
Adams	14	3	0	0	11	0	84,106
Archuleta	2	2	0	0	0	0	2,250
Baca	4	0	0	0	4	0	14,298
Bent	2	0	0	0	2	0	10,124
Fremont	8	0	0	0	8	0	21,434
Garfield	5	0	0	2	3	0	22,079
Jackson	11	4	6	0	1	0	65,762
Kiowa	11	0	0	7	4	0	54,620
La Plata	56	0	0	49	7	0	326,854
Larimer	2	2	0	0	0	0	9,632
Logan	31	16	0	4	11	0	158,651
Mesa	6	0	0	4	2	0	34,197
Moffat	18	8	0	4	6	0	89,705
Montezuma	8	0	0	1	7	0	30,745
Morgan	38	14	0	1	23	0	227,582
Prowers	1	0	0	0	1	0	5,150
Rio Blanco	56	19	0	18	19	0	192,559
Routt	6	4	0	0	2	0	25,994
Sedgwick	2	0	0	1	1	0	7,455
Washington	61	24	0	2	35	0	298,441
Weld	5	1	0	0	4	0	32,667
Yuma	1	1	0	0	0	0	5,699
Total	348	98	6	93	151	0	1,720,004

COLORADO
Wildcat Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Footage
Adams	14	1	1	2	10	82,198
Alamosa	1	0	0	0	1	6,072
Arapahoe	1	0	0	0	1	5,660
Archuleta	2	0	0	0	2	1,372
Baca	8	0	0	1	7	45,762
Bent	12	1	0	0	11	62,083
Boulder	3	1	0	0	2	16,203
Cheyenne	1	0	0	0	1	5,355
Crowley	1	0	0	0	1	6,302
Dolores	2	0	0	0	2	15,315
Fremont	3	0	0	0	3	1,774
Garfield	13	0	0	4	9	57,469
Grand	2	0	0	0	2	5,414
Gunnison	1	0	0	0	1	5,120
Huerfano	2	0	0	0	2	5,024
Jackson	3	0	0	0	3	16,861
Kiowa	5	0	0	0	5	26,846
La Plata	10	0	0	2	8	53,153
Larimer	1	1	0	0	0	3,205
Las Animas	2	0	0	0	2	5,575
Logan	39	1	0	0	38	204,129
Mesa	3	0	0	1	2	18,788
Moffat	21	2	0	2	17	131,259
Montezuma	33	1	0	0	32	64,889
Montrose	3	0	0	0	3	11,175
Morgan	34	3	1	0	30	190,932
Otera	1	0	0	0	1	5,921
Ouray	1	0	0	0	1	4,421
Pitkin	1	0	0	0	1	5,024
Prowers	2	0	0	0	2	10,431
Pueblo	1	0	0	0	1	2,182
Rio Blanco	39	2	0	7	30	174,962
Routt	10	1	0	0	9	37,313
Saguache	1	0	0	0	1	10,346
San Miguel	9	0	1	2	6	86,297
Washington	57	5	0	1	51	279,559
Weld	11	1	0	1	9	63,081
Yuma	5	1	0	0	4	27,719
Total	358	21	3	23	311	1,755,191

FLORIDA
Wildcat Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Footage
Collier	1	0	0	0	1	12,076
Lee	1	0	0	0	1	14,000
Monroe	1	0	0	0	1	15,294
Santa Rosa	2	0	0	0	2	18,962
Total	5	0	0	0	5	60,332

GEORGIA
Wildcat Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Footage
Wayne	1	0	0	0	1	4,551
Total	1	0	0	0	1	4,551

ILLINOIS
Development Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Serv.	Footage
Adams	40	8	0	1	31	0	25,612
Bond	8	0	0	0	8	0	11,404
Brown	43	7	0	0	36	0	18,755
Cass	2	0	0	0	2	0	1,450
Christian	148	81	0	0	56	11	262,431
Clark	59	39	0	0	10	10	132,476
Clay	116	57	0	1	47	11	327,532
Clinton	39	17	0	0	14	8	66,989
Coles	33	9	0	0	5	19	66,745
Crawford	141	26	0	0	12	103	181,716
Cumberland	1	0	0	0	1	0	1,011
DeWitt	1	0	0	0	1	0	
Douglas	16	7	0	1	6	2	12,736
Edgar	2	1	0	0	1	0	3,683
Edwards	16	8	0	0	5	3	43,297
Effingham	20	5	0	0	12	3	51,764
Fayette	40	6	0	0	7	27	80,809
Franklin	66	45	0	0	19	2	181,106

1960 DRILLING BY COUNTIES

ILLINOIS (Continued)

County—	Total	Crude	Cond.	Gas	Dry	Serv.	Footage
Gallatin	35	9	0	0	11	15	87,427
Hamilton	134	43	0	0	42	49	383,869
Henderson	1	0	0	0	1	0	910
Iroquois	15	0	0	0	0	15	13,110
Jasper	52	25	0	0	22	5	140,553
Jefferson	73	30	0	0	24	19	199,222
Lawrence	194	78	0	0	17	99	293,421
Logan	2	0	0	0	2	0	4,258
Macon	5	3	0	0	2	0	10,142
Macoupin	12	4	0	0	8	0	5,784
Madison	6	2	0	0	4	0	5,970
Marion	25	13	0	0	10	2	45,893
Montgomery	1	0	0	0	1	0	1,810
Moultrie	1	0	0	0	1	0	4,337
Perry	2	0	0	0	2	0	2,551
Pike	5	0	0	0	5	0	1,537
Pope	1	0	0	0	1	0	.....
Randolph	10	1	0	0	9	0	12,447
Richland	60	39	0	0	20	1	185,107
Saline	29	9	0	3	16	1	86,606
Sangamon	21	6	0	0	15	0	34,949
Schuyler	9	0	0	0	9	0	1,958
Scott	1	0	0	0	1	0	732
Shelby	1	1	0	0	0	0	1,940
St. Clair	1	0	0	0	1	0	405
Wabash	87	33	0	0	17	37	190,427
Washington	11	3	0	0	6	2	19,916
Wayne	89	37	0	0	32	20	268,116
White	189	71	0	0	48	70	406,735
Williamson	8	5	0	0	3	0	20,272
Total	1,871	728	0	6	603	534	3,899,920

ILLINOIS
Wildcat Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Footage
Adams	17	0	0	0	17	12,042
Bond	4	1	0	0	3	5,928
Brown	34	0	0	0	34	23,669
Champaign	2	0	0	0	2	880
Christian	28	3	0	0	25	52,171
Clark	11	0	0	0	11	13,912
Clay	17	3	0	0	14	52,645
Clinton	19	0	0	0	19	30,449
Coles	8	3	0	1	4	8,841
Crawford	10	1	0	1	8	10,052
Cumberland	4	0	0	0	4	8,590
Douglas	8	2	0	0	6	8,014
Edgar	12	1	0	0	11	12,036
Edwards	8	1	0	0	7	25,444
Effingham	8	0	0	0	8	14,071
Fayette	17	0	0	0	17	31,942
Franklin	12	2	0	0	10	32,918
Gallatin	4	1	0	0	3	7,379
Hamilton	18	1	0	0	17	50,914
Henderson	1	0	0	0	1	876
Iroquois	2	0	0	0	2	4,910
Jackson	3	0	0	0	3	6,127
Jasper	10	1	0	0	9	26,239
Jefferson	12	2	0	0	10	40,217
Kankakee	1	0	0	0	1	300
Lawrence	2	0	0	0	2	4,611
Logan	3	0	0	0	3	4,106
McDonough	2	1	0	0	1	1,165
Macon	7	1	0	0	6	14,564
Macoupin	12	0	0	0	12	10,770
Madison	19	4	0	0	15	27,998
Marion	14	2	0	0	12	25,330
Menard	1	0	0	0	1	1,659
Montgomery	8	0	0	0	8	12,793
Morgan	2	0	0	0	2	1,472
Moultrie	1	0	0	0	1	1,720
Perry	4	0	0	0	4	7,085
Piatt	2	0	0	0	2	5,164
Pike	4	0	0	0	4	1,854
Pope	1	0	0	0	1	790
Randolph	7	0	0	0	7	8,346
Richland	6	2	0	0	4	18,932
St. Clair	7	0	0	0	7	8,804
Saline	7	0	0	0	7	17,007
Sangamon	27	3	0	0	24	43,925
Schuyler	16	2	0	0	14	10,597

ILLINOIS (Continued)

County—	Total	Crude	Cond.	Gas	Dry	Serv.	Footage
Scott	3	0	0	0	3	1,703	
Shelby	2	0	0	0	2	4,910	
Union	1	0	0	0	1	.....	
Wabash	6	0	0	0	6	15,823	
Warren	1	0	0	0	1	605	
Washington	20	0	0	0	20	36,624	
Wayne	20	5	0	0	15	70,806	
White	22	6	0	0	16	69,212	
Williamson	5	0	0	0	5	13,964	
Total	502	48	0	2	452	922,904	

INDIANA
Development Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Serv.	Footage
Blackford	1	1	0	0	0	0	1,027
Crawford	3	0	0	0	3	0	2,832
Daviess	6	0	0	0	6	0	3,389
Decatur	1	0	0	1	0	0	802
Dekalb	1	0	0	1	0	0	2,039
Dubois	24	2	0	3	19	0	20,568
Gibson	194	112	0	0	78	4	386,645
Harrison	1	0	0	0	1	0	458
Jasper	1	0	0	0	1	0	1,880
Jay	1	0	0	0	1	0	30
Knox	20	11	0	0	9	0	34,470
Madison	1	0	0	0	1	0	.....
Miami	1	1	0	0	0	0	911
Monroe	1	0	0	1	0	0	965
Owen	1	0	0	0	1	0	1,510
Perry	12	3	0	0	9	0	7,468
Pike	101	61	0	0	40	0	120,196
Posey	78	38	0	0	38	2	173,071
Spencer	183	60	0	0	120	3	163,152
Sullivan	15	4	0	0	9	2	19,537
Vanderburgh	38	16	0	0	20	2	44,476
Vigo	1	1	0	0	0	0	1,854
Warrick	17	9	0	0	8	0	22,140
Wells	1	0	0	0	1	0	1,230
Total	703	319	0	6	365	13	1,010,650

INDIANA
Wildcat Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Footage
Blackford	1	0	0	0	1	1,100
Brown	1	0	0	0	1	721
Clay	4	0	0	0	4	6,260
Crawford	2	0	0	0	2	2,212
Daviess	3	0	0	0	3	2,176
Dekalb	3	0	0	1	2	7,079
Dubois	31	2	0	2	27	35,818
Gibson	25	1	0	0	24	47,360
Greene	4	0	0	0	4	3,281
Harrison	4	0	0	0	4	3,456
Huntington	1	0	0	0	1	.....
Jackson	3	0	0	0	3	1,463
Jefferson	1	0	0	0	1	419
Jennings	2	0	0	0	2	2,373
Knox	6	1	0	1	4	9,453
Orange	1	0	0	0	1	200
Owen	1	0	0	0	1	.....
Perry	9	0	0	1	8	4,950
Pike	7	0	0	0	7	9,514
Posey	13	5	0	0	8	29,307
Scott	4	0	0	0	4	480
Spencer	176	16	0	1	159	181,192
Steuben	5	0	0	0	5	9,920
Sullivan	11	0	0	0	11	18,243
Tippecanoe	1	0	0	0	1	715
Vanderburgh	13	1	0	0	12	24,165
Vermillion	1	0	0	0	1	1,670
Vigo	9	0	0	0	9	8,861
Wabash	3	0	0	0	3	3,753
Warrick	20	0	0	0	20	30,826
Washington	1	0	0	0	1	901
Total	366	26	0	6	334	447,868

1960 DRILLING BY COUNTIES

KANSAS
Development Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Serv.	Footage
Allen	222	148	0	3	28	43	173,902
Anderson	9	6	0	0	3	0	8,168
Barber	32	13	0	9	10	0	138,917
Barton	141	74	0	0	60	7	496,828
Bourbon	8	4	0	0	4	0	5,355
Butler	183	120	0	0	45	18	457,497
Chase	7	6	0	0	0	1	17,703
Chautauqua	42	30	0	0	11	1	65,579
Clark	10	0	0	7	3	0	56,233
Clay	1	0	0	0	1	0	1,972
Coffey	9	7	0	0	2	0	9,633
Cowley	147	91	0	3	49	4	390,754
Crawford	23	9	0	1	11	2	9,485
Decatur	13	6	0	0	7	0	50,837
Dickinson	8	3	0	0	5	0	20,151
Douglas	17	13	0	0	3	1	19,144
Edwards	12	5	0	3	4	0	54,651
Elk	8	6	0	0	2	0	13,443
Ellis	160	94	0	0	64	2	586,493
Ellsworth	11	8	0	0	3	0	36,097
Finney	27	16	0	5	4	2	116,821
Ford	2	0	0	1	1	0	7,967
Franklin	23	15	0	2	6	0	19,593
Geary	1	0	0	0	1	0	1,828
Graham	53	27	0	0	25	1	210,414
Grant	3	0	0	3	0	0	14,657
Greenwood	170	91	0	1	40	38	338,263
Hamilton	3	0	0	0	3	0	14,032
Harper	32	21	0	3	7	1	146,021
Harvey	26	23	0	0	3	0	83,924
Haskell	33	20	0	7	6	0	183,525
Hodgeman	21	12	0	0	8	1	92,745
Jackson	4	2	0	0	2	0	12,553
Jefferson	2	1	0	0	1	0	4,000
Johnson	30	5	0	15	10	0	17,078
Kearny	3	0	0	1	2	0	13,231
Kingman	102	63	0	8	28	3	428,715
Kiowa	7	4	0	1	2	0	34,994
Labette	12	11	0	0	1	0	8,673
Lane	1	0	0	0	1	0	4,715
Leavenworth	3	2	0	0	1	0	4,567
Linn	2	1	0	0	1	0	1,162
Lyon	3	3	0	0	0	0	6,092
McPherson	73	45	0	1	24	3	219,833
Marion	210	161	0	6	23	20	525,331
Meade	48	5	0	17	26	0	274,154
Miami	71	38	0	3	8	22	39,046
Montgomery	77	38	0	1	33	5	80,751
Morris	20	12	0	1	5	2	57,027
Morton	27	7	0	12	7	1	131,246
Nemaha	2	2	0	0	0	0	7,087
Neosho	213	151	0	11	35	16	137,969
Ness	8	6	0	0	1	1	35,346
Norton	20	15	0	0	5	0	73,215
Pawnee	5	1	0	0	3	1	19,940
Phillips	26	22	0	0	3	1	92,135
Pratt	24	7	0	4	12	1	104,621
Rawlins	34	30	0	0	3	1	147,738
Reno	14	6	0	2	5	1	53,089
Rice	53	37	0	0	16	0	177,760
Riley	9	6	0	0	2	1	16,779
Rooks	35	21	0	0	14	0	124,342
Rush	12	1	0	0	8	3	45,014
Russell	59	37	0	1	16	5	190,701
Saline	27	21	0	0	4	2	87,474
Sedgwick	48	32	0	0	15	1	143,547
Seward	19	4	0	11	4	0	103,950
Sheridan	4	0	0	0	4	0	16,688
Stafford	132	71	0	3	57	1	528,190
Stanton	4	0	1	1	2	0	18,971
Stevens	7	0	0	6	1	0	20,677
Sumner	98	62	0	0	31	5	383,255
Trego	13	5	0	0	7	1	50,680
Wabaunsee	5	3	0	0	2	0	16,365
Wilson	174	57	0	5	106	6	169,819
Woodson	35	30	0	0	1	4	40,926
Total	3,232	1,893	1	158	951	229	8,512,078

KANSAS
Wildcat Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Footage
Anderson	1	0	0	0	1	1,388
Barber	22	5	0	4	13	100,412
Barton	39	13	0	0	26	133,267
Brown	1	0	0	0	1	2,476
Butler	50	4	0	0	46	136,917
Chase	3	0	0	0	3	6,573
Chautauqua	5	0	0	2	3	8,990
Cherokee	1	0	0	0	1	1,016
Cheyenne	14	2	0	0	12	72,566
Clark	6	0	0	1	5	36,607
Clay	1	0	0	0	1	3,046
Comanche	3	1	0	0	2	17,749
Cowley	42	5	0	0	37	120,586
Decatur	12	3	0	0	9	48,684
Dickinson	5	1	0	0	4	13,334
Edwards	11	6	0	0	5	50,699
Elk	2	1	0	0	1	4,590
Ellis	49	9	0	0	40	175,387
Ellsworth	5	0	0	2	3	14,108
Finney	7	2	0	0	5	35,172
Ford	8	1	0	0	7	34,419
Franklin	1	0	0	0	1	1,918
Geary	7	1	0	0	6	15,229
Gove	1	0	0	0	1	4,606
Graham	27	2	0	0	25	108,332
Grant	6	0	0	2	4	34,915
Gray	1	0	0	0	1	6,095
Greenwood	16	0	0	0	16	34,292
Hamilton	7	0	0	7	0	17,555
Harper	15	0	0	0	15	70,070
Harvey	13	2	0	0	11	45,739
Haskell	10	7	0	0	3	56,517
Hodgeman	24	4	0	0	20	112,309
Jackson	4	0	0	0	4	12,138
Jefferson	1	0	0	0	1	1,950
Jewell	1	0	0	0	1	4,437
Kearny	6	0	0	0	6	32,801
Kingman	40	9	0	3	28	171,852
Kiowa	10	1	0	1	8	50,332
Lane	2	0	0	0	2	9,748
Leavenworth	2	0	0	0	2	3,037
Lincoln	4	0	0	0	4	14,153
Logan	4	0	0	0	4	19,633
Lyon	2	0	0	0	2	4,932
McPherson	19	2	0	0	17	62,569
Marion	81	16	0	5	60	214,121
Marshall	12	0	0	0	12	20,905
Meade	14	1	0	1	12	83,706
Miami	1	0	0	0	1	800
Mitchell	1	0	0	0	1	4,041
Morris	20	1	0	0	19	55,937
Morton	9	2	0	5	2	49,594
Ness	18	0	0	0	18	79,919
Norton	5	0	0	0	5	18,814
Osborne	3	0	0	0	3	12,343
Ottawa	1	0	0	0	1	3,295
Pawnee	10	1	0	0	9	41,390
Pottawatomie	14	0	0	0	14	25,944
Pratt	15	2	0	1	12	69,377
Rawlins	8	0	0	0	8	37,970
Reno	17	0	0	0	17	67,815
Rice	11	1	0	0	10	37,606
Riley	13	0	0	0	13	23,833
Rooks	24	7	0	0	17	86,259
Rush	15	2	0	0	13	58,235
Russell	17	3	0	0	14	52,282
Saline	10	4	0	0	6	29,358
Scott	7	2	0	0	5	33,915
Sedgwick	43	2	0	0	41	146,571
Seward	14	1	0	5	8	83,053
Sheridan	8	1	0	0	7	33,310
Sherman	4	0	0	0	4	20,501
Smith	2	0	0	0	2	8,460
Stafford	41	9	0	1	31	165,962
Stanton	5	0	0	0	5	27,948
Stevens	4	0	0	2	2	20,407
Sumner	69	10	0	0	59	281,857
Thomas	8	0	0	0	8	38,809
Trego	4	1	0	0	3	16,929
Wabaunsee	10	0	0	0	10	30,978
Wallace	2	0	0	0	2	10,607
Washington	3	0	0	0	3	9,055
Wichita	3	0	0	0	3	16,742
Total	1,056	147	0	42	867	3,931,793

1960 DRILLING BY COUNTIES

KENTUCKY
Development Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Serv.	Footage
Adair	2	2	0	0	0	0	2,710
Allen	16	16	0	0	0	0	6,235
Bell	6	1	0	3	2	0	18,952
Breathitt	42	27	0	3	12	0	69,045
Breckenridge	29	3	0	1	25	0	13,493
Butler	5	0	0	0	5	0	2,496
Caldwell	13	1	0	0	12	0	7,691
Carter	4	3	0	0	1	0	6,030
Christian	10	4	0	0	6	0	8,427
Clay	3	0	0	3	0	0	7,427
Clinton	188	153	0	0	35	0	208,454
Cumberland	58	37	0	3	18	0	56,929
Daviess	152	54	0	1	92	5	180,506
Elliott	17	15	0	0	2	0	16,565
Estill	1	0	0	0	1	0	815
Floyd	18	5	0	8	5	0	31,851
Grayson	3	0	0	0	3	0	3,303
Green	170	163	0	3	4	0	89,165
Greenup	1	0	0	0	1	0	1,938
Hancock	37	9	0	2	26	0	28,001
Hardin	2	2	0	0	0	0	1,981
Hart	10	10	0	0	0	0	6,440
Henderson	100	41	0	0	51	8	184,430
Hopkins	12	3	0	3	6	0	21,604
Jackson	6	2	0	3	1	0	6,569
Johnson	183	0	0	0	1	182	173,144
Knott	34	1	0	32	1	0	107,981
Knox	33	25	0	0	8	0	17,308
Laurel	2	0	0	1	1	0	4,687
Lawrence	149	10	0	22	15	102	186,588
Lee	122	0	0	0	0	122	122,001
Leslie	5	0	0	2	3	0	13,738
Letcher	23	2	0	17	4	0	74,444
Lincoln	8	7	0	0	1	0	1,680
Logan	1	0	0	0	1	0	615
McLean	62	15	0	2	44	1	85,336
Magoffin	21	0	0	15	6	0	30,318
Martin	10	0	0	8	2	0	32,492
Metcalfe	7	5	0	0	2	0	3,050
Monroe	1	0	0	0	1	0	1,100
Morgan	6	4	0	0	2	0	10,426
Muhlenberg	98	33	0	9	55	1	136,635
Ohio	58	16	0	0	41	1	43,387
Owsley	4	1	0	1	2	0	5,034
Perry	15	0	0	13	2	0	38,578
Pike	95	1	0	87	7	0	365,703
Rockcastle	1	1	0	0	0	0	284
Russell	5	3	0	0	2	0	5,122
Simpson	2	1	0	0	1	0	1,338
Taylor	14	13	0	0	1	0	6,767
Todd	6	0	0	0	6	0	4,251
Union	33	12	0	0	21	0	52,392
Warren	2	2	0	0	0	0	2,135
Webster	27	12	0	0	11	4	60,031
Whitley	20	9	0	6	5	0	25,675
Wolfe	5	2	0	2	1	0	8,291
Total	1,957	726	0	250	555	426	2,601,588

KENTUCKY
Wildcat Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Footage
Allen	1	1	0	0	0	417
Barren	2	0	0	1	1	1,604
Bell	3	0	0	1	2	19,114
Breathitt	5	1	0	0	4	10,362
Breckenridge	5	1	0	0	4	2,554
Caldwell	4	4	0	0	0	2,994
Carter	2	0	0	0	2	4,044
Casey	1	1	0	0	0	1,700
Christian	2	0	0	0	2	2,766
Clay	9	0	0	1	8	11,995
Clinton	22	7	0	3	12	27,349
Cumberland	12	1	0	0	11	10,489
Daviess	9	3	0	0	6	10,755
Elliott	8	0	0	0	8	15,656
Grayson	2	0	0	0	2	2,544
Green	3	0	0	0	3	5,561
Greenup	2	0	0	0	2	1,995
Hancock	8	1	0	0	7	6,568
Hardin	1	0	0	0	1	1,891

KENTUCKY (Continued)

County—	Total	Crude	Cond.	Gas	Dry	Footage
Henderson	11	2	0	0	9	18,608
Hopkins	3	0	0	0	3	5,917
Jackson	6	0	0	0	6	7,767
Johnson	2	1	0	0	1	2,126
Knox	20	6	0	0	14	15,391
Laurel	4	0	0	0	4	5,751
Lawrence	9	1	0	3	5	18,403
Lewis	6	0	0	0	6	8,662
Logan	1	0	0	0	1	1,269
McCreary	1	0	0	0	1	1,562
McLean	11	3	0	1	7	20,783
Magoffin	5	0	0	2	3	8,268
Monroe	4	0	0	0	4	2,842
Morgan	9	2	0	0	7	12,535
Muhlenberg	6	2	0	0	4	9,693
Ohio	4	0	0	1	3	4,822
Owen	1	0	0	1	0	130
Owsley	5	0	0	0	5	6,675
Pulaski	1	0	0	0	1	700
Rockcastle	2	0	0	0	2	2,487
Russell	1	0	0	0	1	911
Simpson	1	1	0	0	0	212
Taylor	1	0	0	0	1	557
Todd	1	1	0	0	0	1,132
Union	3	1	0	0	2	6,713
Webster	2	2	0	0	0	5,845
Whitley	2	0	0	0	2	2,732
Total	223	42	0	14	167	312,851

NORTH LOUISIANA
Development Completions by Parishes

Parish—	Total	Crude	Cond.	Gas	Dry	Serv.	Footage
Bienville	17	0	0	7	10	0	135,317
Bossier	21	6	0	7	8	0	102,493
Caddo	294	244	0	19	31	0	589,978
Caldwell	4	0	0	1	3	0	18,720
Catahoula	60	26	0	0	34	0	289,816
Claiborne	42	28	0	6	8	0	231,623
Concordia	47	18	0	0	29	0	286,573
DeSoto	107	30	0	23	54	0	352,001
Franklin	6	1	0	0	5	0	25,446
Grant	21	9	0	0	12	0	39,990
Jackson	1	0	0	0	1	0	9,036
LaSalle	105	51	0	1	53	0	309,201
Lincoln	20	2	1	11	6	0	170,376
Morehouse	1	0	0	1	0	0	2,285
Natchitoches	18	17	0	0	1	0	25,751
Ouachita	17	1	0	12	4	0	148,131
Red River	39	21	0	6	12	0	104,638
Richland	12	5	0	1	6	0	36,947
Sabine	16	7	0	0	9	0	48,357
Tensas	35	18	0	1	16	0	294,348
Union	123	3	0	114	6	0	307,547
Webster	56	29	0	6	20	1	299,692
Winn	122	79	0	0	43	0	178,538
Total	1,184	595	1	216	371	1	4,006,804

NORTH LOUISIANA
Wildcat Completions by Parishes

Parish—	Total	Crude	Cond.	Gas	Dry	Footage
Bienville	12	0	0	2	10	70,947
Bossier	12	0	0	3	9	37,545
Caddo	9	0	0	1	8	31,663
Caldwell	4	0	0	0	4	17,537
Catahoula	53	7	0	0	46	272,034
Claiborne	5	1	0	1	3	53,219
Concordia	34	6	0	0	28	220,655
DeSoto	18	2	0	2	14	58,199
Franklin	8	0	0	0	8	44,099
Grant	7	0	0	0	7	23,307
Jackson	7	0	1	0	6	60,531
LaSalle	20	2	0	0	18	92,459
Lincoln	2	0	0	2	0	18,950
Madison	9	0	0	0	9	55,734
Morehouse	1	0	0	0	1	6,609
Natchitoches	2	0	0	0	2	5,737
Ouachita	1	0	0	1	0	10,537
Red River	8	1	0	0	7	25,324
Richland	2	0	0	0	2	23,289
Sabine	1	0	0	0	1	10,473

1960 DRILLING BY COUNTIES

NORTH LOUISIANA (Continued)

Parish—	Total	Crude	Cond.	Gas	Dry	Footage
Tensas	14	2	0	1	11	122,781
Union	3	1	0	1	1	16,764
Webster	2	1	0	0	1	12,604
West Carroll	3	0	0	0	3	16,665
Winn	31	3	0	0	28	54,011
Total	268	26	1	14	227	1,361,673

SOUTH LOUISIANA
Development Completions by Parishes

Parish—	Total	Crude	Cond.	Gas	Dry	Serv.	Footage
Acadia	113	41	18	5	49	0	924,644
Allen	15	1	4	1	9	0	134,127
Ascension	16	6	1	0	8	1	112,067
Assumption	14	6	5	0	3	0	166,743
Avoyelles	2	0	0	0	2	0	17,367
Beauregard	26	7	2	1	15	1	207,752
Calcasieu	68	21	10	2	33	2	496,924
Cameron	53	17	14	1	20	1	573,801
E. Baton Rouge	5	3	0	0	2	0	54,483
Evangeline	8	2	3	0	3	0	74,581
Iberia	33	10	7	3	13	0	378,422
Iberville	43	28	1	4	10	0	318,340
Jefferson	37	27	1	0	9	0	343,743
Jefferson Davis	20	3	9	0	7	1	212,490
Lafayette	15	1	6	0	7	1	175,752
Lafourche	180	99	29	4	48	0	1,873,826
Plaquemines	316	243	21	3	49	0	2,952,984
Pointe Coupee	6	2	1	0	3	0	58,027
Rapides	3	0	2	0	1	0	21,496
St. Bernard	16	7	2	1	6	0	136,038
St. Charles	35	24	2	1	8	0	333,238
St. James	3	2	1	0	0	0	28,824
St. John	4	1	0	0	2	0	41,617
St. Landry	72	33	15	2	22	0	653,940
St. Martin	63	34	4	1	23	1	483,561
St. Mary	94	54	22	2	16	0	1,279,157
Tangipahoa	1	0	0	0	1	0	12,411
Terrebonne	197	98	45	8	46	0	2,431,008
Vermilion	57	15	20	1	21	0	696,341
Total	1,515	785	245	40	437	8	15,202,704

SOUTH LOUISIANA
Wildcat Completions by Parishes

Parish—	Total	Crude	Cond.	Gas	Dry	Footage
Acadia	11	0	1	0	10	103,990
Allen	8	0	0	0	8	72,305
Ascension	1	0	0	0	1	10,200
Assumption	11	1	0	0	10	142,096
Avoyelles	1	0	0	0	1	9,094
Beauregard	22	1	1	0	20	189,073
Calcasieu	18	2	1	0	15	161,737
Cameron	25	2	1	3	19	311,849
East Baton Rouge	1	0	0	0	1	10,315
Evangeline	4	1	0	0	3	36,383
Iberia	4	0	1	0	3	55,907
Iberville	8	2	0	0	6	80,425
Jefferson	8	1	0	0	7	94,174
Jefferson Davis	11	0	1	0	10	127,727
Lafayette	5	1	1	0	3	61,809
Lafourche	12	0	2	0	10	161,198
Orleans	1	0	0	0	1	10,208
Plaquemines	20	0	0	1	19	233,562
Pointe Coupee	1	0	0	0	1	10,738
Rapides	1	0	0	0	1	5,100
St. Bernard	4	0	0	0	4	43,666
St. Charles	4	0	0	0	4	44,769
St. Helena	2	0	0	0	2	22,478
St. James	2	0	0	0	2	19,686
St. John	4	0	0	0	4	43,554
St. Landry	6	0	0	0	6	55,020
St. Martin	9	1	0	0	8	119,547
St. Mary	3	0	0	0	3	41,044
St. Tammany	1	0	0	0	1	8,008
Tangipahoa	3	1	0	0	2	30,666
Terrebonne	14	0	1	0	13	210,918
Vermilion	21	1	2	0	18	295,006
Washington	4	0	0	0	4	43,224
Total	250	14	12	4	220	2,865,476

LOUISIANA OFFSHORE
Development Completions by Areas

Area—	Total	Crude	Cond.	Gas	Dry	Serv.	Footage
Bay Marchand	28	19	1	1	7	0	268,404
East Cameron	20	2	9	1	8	0	229,412
West Cameron	26	10	9	1	6	0	301,122
Eugene Island	101	49	11	1	40	0	1,078,607
Grand Isle	43	38	1	1	2	1	472,731
Main Pass	6	5	0	0	1	0	42,529
Ship Shoal	30	12	5	1	12	0	355,386
South Marsh Island	20	7	11	0	2	0	198,350
South Pass	85	74	1	1	9	0	747,802
South Timbalier	29	21	0	0	8	0	343,994
Vermilion	22	3	14	0	5	0	225,480
West Delta	46	25	9	1	11	0	532,243
Total	456	265	71	8	111	1	4,796,060

LOUISIANA OFFSHORE
Wildcat Completions by Areas

Area—	Total	Crude	Cond.	Gas	Dry	Footage
East Cameron	1	0	0	0	1	12,000
West Cameron	8	0	4	0	4	100,120
Eugene Island	6	0	0	0	6	79,525
Main Pass	2	0	0	0	2	19,596
Ship Shoal	4	0	0	0	4	53,544
South Marsh Island	2	0	1	0	1	23,287
South Pass	1	0	0	0	1	14,000
South Timbalier	3	0	0	0	3	45,480
Vermilion	5	0	0	0	5	71,096
West Delta	2	0	0	0	2	24,269
Total	34	0	5	0	29	442,917

MICHIGAN
Development Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Serv.	Footage
Allegan	32	2	0	2	8	20	82,753
Arenac	1	0	0	0	1	0	4,231
Barry	1	0	0	0	1	0	2,070
Bay	2	0	0	0	2	0	6,820
Calhoun	119	84	0	1	34	0	522,751
Clare	1	0	0	0	1	0	1,488
Gladwin	5	3	0	0	2	0	18,101
Gratiot	33	11	0	0	3	19	53,800
Hillsdale	105	53	0	6	46	0	421,823
Isabella	3	0	0	0	0	3	11,317
Jackson	105	77	0	2	26	0	441,196
Kalamazoo	1	1	0	0	0	0	1,307
Kent	12	12	0	0	0	0	21,681
Livingston	1	0	0	0	1	0	1,842
Macomb	7	0	0	4	3	0	20,146
Manistee	1	0	0	0	1	0	3,977
Mason	6	2	0	1	3	0	12,650
Mecosta	14	0	0	0	0	14	17,878
Midland	10	5	0	0	2	3	32,381
Missaukee	15	13	0	0	1	1	61,324
Monroe	4	4	0	0	0	0	8,722
Montcalm	29	0	0	0	3	26	43,163
Muskegon	2	2	0	0	0	0	3,539
Newaygo	5	1	0	1	3	0	9,631
Oakland	3	2	0	0	1	0	13,884
Oceana	20	8	0	0	12	0	40,216
Ogemaw	3	2	0	1	0	0	10,038
Osceola	9	2	0	0	7	0	21,787
Ottawa	50	39	0	2	9	0	98,347
Roscommon	1	1	0	0	0	0	4,942
St. Clair	48	23	0	1	24	0	139,933
Van Buren	2	1	0	0	1	0	2,382
Wayne	1	0	0	1	0	0	4,072
Total	651	348	0	22	195	86	2,140,192

MICHIGAN
Wildcat Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Footage
Allegan	11	1	0	0	10	35,182
Antrim	1	0	0	0	1	5,100
Arenac	3	0	0	0	3	9,168
Barry	4	0	0	0	4	20,267
Bay	3	0	0	0	3	9,524

1960 DRILLING BY COUNTIES

MICHIGAN (Continued)

County—	Total	Crude	Cond.	Gas	Dry	Footage
Branch	4	0	0	0	4	14,289
Calhoun	21	3	0	2	16	90,850
Cass	1	0	0	0	1	2,610
Clare	3	0	0	0	3	13,436
Clinton	2	0	0	0	2	10,853
Eaton	5	0	0	0	5	26,187
Gladwin	1	0	0	0	1	3,905
Hillsdale	36	2	0	0	34	141,198
Ingham	2	0	0	0	2	8,096
Isabella	2	0	0	0	2	7,708
Jackson	29	1	0	0	28	140,133
Kalamazoo	1	0	0	0	1	4,125
Kent	2	0	0	0	2	4,230
Lake	3	0	0	0	3	10,335
Lapeer	1	0	0	0	1	6,000
Leelanau	1	0	0	0	1	5,900
Lenawee	7	0	0	0	7	26,655
Livingston	3	0	0	0	3	12,275
Macomb	11	0	0	1	10	39,286
Manistee	1	0	0	0	1	2,071
Mason	7	0	0	0	7	17,862
Mecosta	7	0	0	0	7	25,019
Midland	1	0	0	0	1	3,857
Missaukee	2	0	0	0	2	5,348
Monroe	6	0	0	0	6	13,317
Montcalm	4	0	0	0	4	14,194
Muskegon	3	0	0	0	3	6,258
Newaygo	6	0	0	0	6	16,650
Oakland	3	0	0	0	3	12,246
Oceana	15	1	0	0	14	32,612
Osceola	2	0	0	0	2	5,354
Ottawa	4	0	0	0	4	9,631
Presque Isle	1	0	0	0	1	4,990
Saginaw	1	0	0	0	1	4,247
Sanilac	2	0	0	0	2	10,253
Shiawassee	1	0	0	0	1	6,816
St. Clair	19	1	0	1	17	63,275
St. Joseph	1	0	0	0	1	3,335
Van Buren	1	0	0	0	1	874
Washtenaw	2	0	0	0	2	7,576
Wayne	1	0	0	0	1	930
Total	246	9	0	4	233	914,027

MISSISSIPPI
Development Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Serv.	Footage
Adams	34	17	0	0	17	0	216,109
Amite	12	5	0	0	7	0	136,335
Clarke	16	11	0	0	5	0	70,119
Clay	2	0	1	1	0	0	20,158
Forrest	11	0	5	2	4	0	70,930
Franklin	14	5	0	0	9	0	112,003
Hancock	3	0	2	0	1	0	32,603
Hinds	6	4	0	0	2	0	68,813
Issaquena	1	0	0	0	1	0	8,037
Jasper	6	6	0	0	0	0	68,680
Jefferson	5	3	1	0	1	0	36,528
Jefferson Davis	7	0	4	1	2	0	102,391
Jones	28	21	0	0	7	0	322,997
Lamar	10	5	1	0	4	0	87,930
Lincoln	9	6	0	0	3	0	97,005
Marion	16	3	5	1	6	1	176,998
Monroe	4	0	0	0	4	0	14,387
Pearl River	11	2	4	0	5	0	96,773
Pike	173	156	0	0	17	0	1,889,306
Rankin	1	0	0	0	1	0	9,520
Scott	4	1	0	0	3	0	26,029
Simpson	12	9	0	0	3	0	161,508
Smith	6	5	0	0	1	0	80,866
Walthall	15	4	6	2	3	0	163,405
Wayne	20	16	0	0	4	0	201,334
Wilkinson	2	0	0	0	2	0	15,157
Total	428	279	29	7	112	1	4,285,921

MISSISSIPPI
Wildcat Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Footage
Adams	34	4	0	0	30	224,063
Amite	26	7	0	0	19	299,907

MISSISSIPPI (Continued)

County—	Total	Crude	Cond.	Gas	Dry	Footage
Calhoun	1	0	0	1	0	4,227
Chickasaw	1	0	0	0	1	7,476
Clarke	16	3	0	0	13	80,721
Copiah	1	0	0	0	1	13,510
Covington	1	0	0	0	1	14,787
Forrest	5	0	0	0	5	59,448
Franklin	24	3	0	0	21	219,751
George	1	0	0	0	1	12,013
Greene	1	0	0	0	1	9,015
Hancock	3	1	0	0	2	31,021
Hinds	4	0	0	0	4	47,000
Issaquena	4	0	0	0	4	16,047
Itawamba	1	0	0	0	1	1,320
Jasper	11	0	0	0	11	83,392
Jefferson	9	0	0	0	9	83,098
Jones	5	1	0	0	4	62,638
Lamar	3	0	0	0	3	32,893
Lawrence	1	0	0	0	1	10,700
Lincoln	10	0	0	0	10	110,432
Madison	2	0	0	0	2	21,834
Marion	5	1	1	0	3	63,500
Monroe	5	1	0	0	4	17,182
Pearl River	5	0	0	0	5	48,285
Perry	2	0	0	0	2	27,224
Pike	27	3	0	0	24	304,112
Rankin	2	1	0	0	1	24,393
Scott	1	0	0	0	1	5,094
Sharkey	1	0	0	0	1	4,045
Simpson	2	0	0	0	2	29,025
Smith	10	0	0	0	10	129,468
Stone	1	0	0	0	1	11,512
Warren	3	0	0	0	3	33,993
Walthall	9	1	0	1	7	109,956
Wayne	11	2	0	0	9	116,011
Wilkinson	10	0	0	0	10	93,077
Yazoo	9	1	0	0	8	83,889
Total	267	29	1	2	235	2,546,059

MONTANA
Development Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Serv.	Footage
Big Horn	2	0	0	0	2	0	100
Carter	2	0	0	0	2	0	15,053
Dawson	8	8	0	0	0	0	72,889
Fallon	36	36	0	0	0	0	320,327
Glacier	32	23	0	1	8	0	105,786
Hill	2	0	0	0	2	0	7,066
McCone	3	2	0	0	1	0	23,681
Musselshell	31	19	0	0	12	0	133,908
Petroleum	2	1	0	0	1	0	3,660
Pondera	9	7	0	0	2	0	28,088
Prairie	4	4	0	0	0	0	36,600
Richland	1	1	0	0	0	0	9,240
Rosebud	25	10	0	0	15	0	125,371
Sheridan	3	2	0	0	1	0	23,943
Stillwater	4	0	0	1	3	0	9,462
Teton	7	3	0	0	4	0	13,788
Toole	13	5	0	2	5	1	22,713
Wibaux	1	1	0	0	0	0	9,116
Total	185	122	0	4	58	1	960,791

MONTANA
Wildcat Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Footage
Big Horn	2	0	0	0	2	7,926
Blaine	1	0	0	0	1	1,030
Carbon	8	0	0	0	8	14,880
Carter	8	0	0	0	8	31,737
Cascade	1	0	0	0	1	1,002
Chouteau	2	0	0	0	2	3,997
Custer	2	0	0	0	2	6,086
Daniels	1	0	0	0	1	9,210
Dawson	1	0	0	0	1	10,238
Fergus	4	0	0	0	4	8,322
Garfield	3	0	0	0	3	20,388
Glacier	6	1	0	0	5	21,179

1960 DRILLING BY COUNTIES

MONTANA (Continued)

County—	Total	Crude	Cond.	Gas	Dry	Footage
Golden Valley	1	0	0	0	1	5,963
Hill	1	0	0	0	1	6,550
Judith Basin	3	0	0	0	3	11,324
Liberty	5	0	0	0	5	14,849
McCone	2	0	0	0	2	14,201
Musselshell	22	3	0	0	19	99,154
Park	1	0	0	0	1	7,010
Petroleum	3	0	0	0	3	9,757
Phillips	1	0	0	0	1	4,288
Pondera	11	1	0	0	10	29,581
Powder River	3	0	0	0	3	12,867
Richland	1	0	0	0	1	6,565
Roosevelt	2	1	0	0	1	15,173
Rosebud	20	2	0	0	18	102,689
Sheridan	3	2	0	0	1	27,577
Stillwater	13	0	0	2	11	51,881
Sweetgrass	1	0	0	0	1	7,486
Teton	6	0	0	0	6	22,054
Toole	13	0	0	2	11	32,283
Valley	11	0	0	0	11	55,437
Wheatland	2	0	0	0	2	8,514
Wibaux	1	0	0	0	1	10,720
Yellowstone	3	0	0	0	3	12,705
Total	168	10	0	4	154	704,623

NEBRASKA
Development Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Serv.	Footage
Banner	122	46	0	0	75	1	751,312
Cheyenne	74	29	0	2	42	1	374,960
Deuel	1	0	0	0	1	0	3,400
Dundy	1	1	0	0	0	0	4,450
Hitchcock	23	22	0	0	1	0	94,029
Kimball	166	53	0	0	113	0	1,094,315
Morrill	35	22	0	0	13	0	168,237
Red Willow	79	68	0	0	11	0	280,090
Richardson	1	1	0	0	0	0	3,287
Scotts Bluff	2	1	0	0	1	0	11,582
Total	504	243	0	2	257	2	2,785,662

NEBRASKA
Wildcat Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Footage
Arthur	1	0	0	0	1	5,076
Banner	72	9	0	0	63	451,592
Box Butte	2	0	0	0	2	6,722
Buffalo	4	0	0	0	4	16,328
Chase	2	0	0	0	2	9,916
Cheyenne	73	7	0	0	66	376,935
Dawes	1	0	0	0	1	2,980
Dawson	2	0	0	0	2	7,748
Deuel	3	0	0	0	3	10,629
Dundy	7	1	0	0	6	34,864
Frontier	4	0	0	0	4	15,631
Furnas	3	0	0	0	3	10,672
Gage	2	0	0	0	2	3,411
Gosper	1	0	0	0	1	3,940
Hall	1	0	0	0	1	4,092
Hancock	1	0	0	0	1	507
Harlan	2	0	0	0	2	8,833
Hitchcock	12	1	0	0	11	54,621
Holt	1	0	0	0	1	3,590
Johnson	1	0	0	0	1	1,630
Kearney	1	0	0	0	1	4,384
Kimball	92	9	0	0	83	602,135
Lincoln	1	0	0	0	1	1,724
Morrill	36	4	0	0	32	170,476
Phelps	1	0	0	0	1	4,072
Red Willow	37	4	0	0	33	137,690
Scotts Bluff	11	1	0	0	10	60,086
Sioux	17	0	0	0	17	74,593
Wheeler	1	0	0	0	1	3,311
Total	392	36	0	0	356	2,088,178

NEVADA
Wildcat Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Footage
Clark	1	0	0	0	1	2,602
Churchill	2	0	0	0	2	9,160
Total	3	0	0	0	3	11,762

WEST NEW MEXICO
Development Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Serv.	Footage
McKinley	8	2	0	0	1	5	3,609
Rio Arriba	194	27	4	153	10	0	1,002,750
Sandoval	5	2	0	1	2	0	8,724
San Juan	408	158	28	196	22	4	2,034,637
Total	615	189	32	350	35	9	3,049,720

WEST NEW MEXICO
Wildcat Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Footage
Catron	1	0	0	0	1	5,397
McKinley	10	2	0	0	8	26,920
Rio Arriba	15	3	0	1	11	52,956
Sandoval	4	0	0	0	4	9,305
San Juan	36	3	0	0	33	144,636
Socorro	1	0	0	0	1	4,784
Valencia	3	0	0	0	3	14,436
Total	70	8	0	1	61	258,434

EAST NEW MEXICO
Development Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Serv.	Footage
Chaves	50	34	0	1	13	2	121,124
Eddy	410	315	4	11	79	1	1,805,685
Lea	493	417	5	9	59	3	2,703,729
Roosevelt	32	29	0	0	3	0	308,600
Total	985	795	9	21	154	6	4,939,138

EAST NEW MEXICO
Wildcat Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Footage
Chaves	32	2	0	0	30	70,538
Colfax	1	0	0	0	1	5,990
De Baca	2	0	0	0	2	10,961
Eddy	60	7	2	1	50	263,068
Harding	4	0	0	0	4	5,526
Lea	69	10	3	1	55	541,897
Lincoln	1	0	0	0	1	752
Otero	2	0	0	0	2	7,877
Quay	1	0	0	0	1	5,260
Roosevelt	8	3	0	0	5	66,823
Total	180	22	5	2	151	978,692

NEW YORK
Development Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Serv.	Footage
Ontario	16	0	0	15	1	0	42,643
Shallow areas	240	126	0	0	28	86	314,820
Total	256	126	0	15	29	86	357,463

NEW YORK
Wildcat Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Footage
Allegany	8	0	0	3	5	37,860
Cattaraugus	3	0	0	0	3	12,808
Cayuga	2	0	0	2	0	3,604
Chautauqua	3	0	0	2	1	10,665
Chemung	2	0	0	0	2	6,068
Herkimer	1	0	0	0	1	3,569
Livingston	1	0	0	0	1	3,020

1960 DRILLING BY COUNTIES

NEW YORK (Continued)

County—	Total	Crude	Cond.	Gas	Dry	Footage
Madison	6	0	0	1	5	22,078
Ontario	9	0	0	4	5	29,263
Schuyler	1	0	0	0	1	3,360
Steuben	2	0	0	0	2	6,997
Tompkins	1	0	0	0	1	1,846
Wyoming	3	0	0	1	2	8,077
Yates	2	0	0	0	2	2,490
Total	44	0	0	13	31	151,705

NORTH DAKOTA
Development Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Serv.	Footage
Billings	3	2	0	0	1	0	28,935
Bottineau	50	35	0	0	15	0	193,174
Bowman	2	2	0	0	0	0	16,810
Burke	58	42	0	0	16	0	377,681
Divide	7	7	0	0	0	0	54,495
McHenry	1	0	0	0	1	0	4,442
McKenzie	42	34	0	0	7	1	390,514
Renville	27	20	0	0	7	0	113,849
Williams	11	8	1	0	2	0	119,868
Total	201	150	1	0	49	1	1,299,768

NORTH DAKOTA
Wildcat Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Footage
Billings	2	1	0	0	1	20,248
Bottineau	14	1	0	0	13	56,041
Bowman	1	1	0	0	0	8,390
Burke	13	1	0	0	12	90,111
Cavalier	1	0	0	0	1	1,709
Divide	8	0	0	0	8	59,329
Dunn	4	0	0	0	4	48,487
McHenry	10	1	0	0	9	37,387
McKenzie	7	2	0	0	5	81,860
Mountrail	2	0	0	0	2	19,058
Pierce	2	0	0	0	2	6,197
Ramsey	1	0	0	0	1	1,957
Renville	13	2	0	0	11	58,977
Rolette	2	0	0	0	2	5,629
Stark	1	0	0	0	1	9,103
Walsh	1	0	0	0	1	2,500
Total	82	9	0	0	73	506,983

OHIO
Development Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Serv.	Footage
Ashland	81	44	0	3	25	9	74,866
Ashtabula	39	1	0	34	4	0	125,126
Athens	17	6	0	4	7	0	7,075
Auglaize	1	0	0	0	1	0	1,337
Belmont	6	1	0	1	4	0	7,554
Carroll	3	1	0	0	2	0	4,076
Columbiana	12	3	0	6	3	0	10,724
Coshocton	55	25	0	15	15	0	158,631
Delaware	2	0	0	0	2	0	7,383
Fairfield	12	10	0	0	2	0	31,285
Gallia	5	0	0	4	1	0	9,054
Guernsey	5	0	0	1	4	0	5,104
Hancock	1	0	0	0	1	0	1,485
Hocking	69	57	0	3	9	0	185,175
Holmes	42	23	0	6	11	2	144,592
Jackson	3	0	0	2	1	0	2,217
Jefferson	6	1	0	0	5	0	7,958
Knox	52	34	0	6	11	1	146,277
Licking	50	42	0	0	8	0	118,219
Lorain	2	0	0	1	1	0	4,882
Lucas	1	0	0	0	1	0	1,459
Mahoning	1	0	0	0	1	0	580
Medina	62	4	0	21	6	31	130,763
Meigs	19	1	0	7	11	0	21,722
Mercer	3	2	0	0	1	0	3,604
Monroe	17	11	0	2	4	0	22,115
Morgan	21	6	0	6	9	0	29,046

OHIO (Continued

County—	Total	Crude	Cond.	Gas	Dry	Serv.	Footage
Morrow	3	0	0	0	3	0	11,226
Muskingum	40	15	0	10	15	0	138,296
Noble	18	5	0	3	8	2	17,446
Paulding	1	1	0	0	0	0	1,457
Perry	56	35	0	9	11	1	169,062
Portage	14	3	0	8	3	0	60,351
Richland	9	0	0	4	4	1	23,462
Stark	50	3	0	17	3	27	218,353
Summit	13	3	0	2	1	7	52,607
Tuscarawas	27	14	0	5	8	0	44,992
Vinton	50	11	0	30	9	0	122,190
Washington	54	25	0	7	22	0	62,969
Wayne	120	64	0	31	25	0	374,716
Wyandot	2	0	0	1	1	0	2,874
Total	1,044	451	0	249	263	81	2,562,310

OHIO
Wildcat Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Footage
Ashland	3	0	0	0	3	14,371
Ashtabula	10	0	0	3	7	37,135
Brown	1	0	0	0	1	2,100
Butler	1	0	0	0	1	2,933
Clermont	1	0	0	0	1	3,436
Clinton	2	0	0	0	2	5,143
Coshocton	1	0	0	0	1	5,845
Delaware	1	0	0	0	1	3,005
Erie	1	0	0	0	1	4,417
Fairfield	1	1	0	0	0	3,328
Fayette	1	0	0	0	1	1,879
Fulton	1	0	0	0	1	2,820
Holmes	1	0	0	0	1	4,045
Licking	1	0	0	0	1	3,882
Lorain	1	0	0	0	1	4,591
Mahoning	1	0	0	1	0	4,966
Medina	1	0	0	0	1	5,431
Meigs	1	0	0	0	1	4,812
Montgomery	1	0	0	1	0	1,135
Morrow	3	2	0	0	1	10,162
Muskingum	1	0	0	1	0	3,581
Paulding	1	0	0	0	1	2,585
Perry	3	0	0	2	1	10,349
Portage	3	0	0	1	2	13,382
Sendusky	1	0	0	0	1	3,123
Trumbull	5	0	0	1	4	21,508
Tuscarawas	2	0	0	0	2	2,570
Van Wert	1	0	0	0	1	1,776
Warren	2	0	0	0	2	5,878
Wayne	2	0	0	1	1	11,352
Total	55	3	0	11	41	201,540

OKLAHOMA
Development Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Serv.	Footage
Alfalfa	29	17	0	6	6	0	150,303
Atoka	2	0	0	0	2	0	2,471
Beaver	225	51	17	99	58	0	1,687,470
Beckham	10	4	0	4	1	1	16,872
Blaine	3	0	0	2	1	0	30,267
Bryan	1	0	0	1	0	0	7,865
Caddo	60	50	0	0	10	0	156,926
Canadian	1	1	0	0	0	0	12,922
Carter	217	182	0	2	32	1	789,283
Cimarron	20	3	0	8	9	0	100,343
Cleveland	41	28	0	4	9	0	316,813
Coal	3	1	0	0	1	1	17,645
Comanche	23	9	0	1	13	0	45,829
Cotton	16	5	0	0	8	3	34,173
Creek	244	105	0	6	30	103	545,173
Custer	2	0	0	2	0	0	30,052
Dewey	10	1	2	3	4	0	104,791
Ellis	22	1	3	12	6	0	195,408
Garfield	41	17	1	0	20	3	129,510
Garvin	74	45	4	3	21	1	479,265
Grady	6	4	1	1	0	0	51,190
Grant	69	45	2	9	12	1	345,254
Greer	1	0	0	0	1	0	886
Harper	66	12	4	35	15	0	455,024
Haskell	4	0	0	3	1	0	25,077

1960 DRILLING BY COUNTIES

OKLAHOMA (Continued)

County—	Total	Crude	Cond.	Gas	Dry	Serv.	Footage
Hughes	43	16	0	5	15	7	102,027
Jefferson	35	21	0	1	9	4	57,935
Kay	116	82	0	4	27	3	420,971
Kingfisher	100	85	0	11	4	0	693,495
Kiowa	30	11	0	2	17	0	20,142
Lincoln	81	23	1	13	36	8	324,972
Logan	20	6	0	8	5	1	91,331
Love	23	10	3	0	10	0	92,182
McClain	107	83	6	5	13	0	941,520
McIntosh	8	0	0	0	8	0	22,028
Major	29	14	2	6	7	0	212,291
Marshall	35	18	0	2	14	1	97,943
Murray	9	5	0	0	3	1	40,465
Muskogee	61	41	0	1	14	5	85,558
Noble	63	40	0	6	17	0	281,153
Nowata	81	36	0	5	30	10	62,284
Okfuskee	139	79	0	12	43	5	431,664
Oklahoma	24	10	2	3	9	0	138,802
Okmulgee	162	86	0	8	34	34	266,224
Osage	326	151	0	2	87	86	693,506
Pawnee	41	16	0	1	15	9	101,963
Payne	32	16	0	1	10	5	113,032
Pittsburg	5	1	0	2	2	0	14,998
Pontotoc	80	34	0	4	28	14	147,893
Pottawatomie	55	39	0	1	13	2	239,240
Rogers	92	42	0	0	21	29	60,955
Seminole	189	116	0	8	57	8	499,550
Sequoyah	1	0	0	1	0	0	6,640
Stephens	151	87	1	6	35	22	319,385
Texas	85	30	3	25	26	1	500,256
Tillman	18	9	0	0	8	1	64,890
Tulsa	210	110	0	4	46	50	301,330
Wagoner	22	5	0	2	13	2	23,725
Washington	412	250	0	7	37	118	454,547
Washita	2	0	0	1	1	0	13,287
Woods	12	1	2	3	6	0	68,628
Woodward	13	0	0	8	5	0	101,067
Total	4,102	2,154	54	369	985	540	13,838,691

OKLAHOMA
Wildcat Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Footage
Alfalfa	10	1	0	0	9	56,800
Atoka	7	0	0	0	7	8,484
Beaver	24	5	2	8	9	190,919
Beckham	4	0	0	2	2	14,273
Blaine	3	0	0	0	3	23,870
Bryan	4	0	0	0	4	16,164
Caddo	10	0	0	2	8	49,667
Canadian	3	1	0	1	1	34,678
Carter	21	10	0	0	11	120,740
Cherokee	2	0	0	0	2	995
Cimarron	2	0	0	0	2	11,554
Cleveland	36	9	1	0	26	289,772
Coal	5	1	1	1	2	32,790
Comanche	9	0	0	1	8	23,964
Cotton	5	0	0	0	5	11,482
Creek	7	2	0	0	5	20,746
Custer	1	0	0	0	1	15,617
Delaware	1	0	0	0	1	650
Dewey	9	2	0	0	7	102,449
Ellis	10	2	1	3	4	95,221
Garfield	12	5	1	1	5	71,439
Garvin	11	3	0	0	8	47,400
Grady	3	0	1	0	2	27,832
Grant	8	4	0	0	4	43,760
Greer	8	0	0	0	8	11,846
Harmon	1	0	0	0	1	5,220
Harper	12	1	1	1	9	80,867
Haskell	5	0	0	3	2	33,648
Hughes	9	2	0	1	6	28,889
Jackson	1	0	0	0	1	2,864
Jefferson	21	2	0	0	19	68,994
Johnston	1	0	0	0	1	3,500
Kay	32	3	0	3	26	141,339
Kingfisher	26	16	2	3	5	185,219
Kiowa	18	0	0	0	18	23,293
Latimer	2	0	0	2	0	19,747
Lincoln	32	4	0	5	23	140,174
Logan	13	1	0	3	9	71,574

OKLAHOMA (Continued)

County—	Total	Crude	Cond.	Gas	Dry	Footage
Love	11	2	1	0	8	83,802
McClain	22	10	0	0	12	210,124
McCurtain	6	0	0	0	6	4,649
McIntosh	10	0	0	3	7	26,319
Mayes	1	0	0	0	1	225
Major	9	3	1	2	3	70,856
Marshall	3	0	0	0	3	12,709
Murray	10	2	0	0	8	32,322
Muskogee	4	1	0	0	3	5,695
Noble	13	3	0	1	9	57,793
Okfuskee	17	4	0	1	12	56,645
Oklahoma	9	2	3	0	4	60,053
Okmulgee	5	1	0	4	0	15,001
Osage	53	10	0	0	43	138,099
Pawnee	3	0	0	0	3	9,777
Payne	7	1	0	0	6	33,275
Pittsburg	10	0	0	1	9	32,795
Pontotoc	8	0	0	0	8	20,631
Pottawatomie	18	7	0	0	11	94,095
Pushmataha	2	0	0	0	2	2,729
Roger Mills	2	0	0	0	2	16,194
Seminole	11	2	0	0	9	37,206
Sequoyah	1	0	0	1	0	6,253
Stephens	31	6	0	2	23	152,731
Texas	15	1	1	5	8	94,087
Tillman	6	0	0	0	6	25,672
Washita	1	0	1	0	0	9,890
Woods	16	0	1	4	11	91,476
Woodward	8	1	0	1	6	63,295
Total	700	130	18	65	487	3,592,838

PENNSYLVANIA
Development Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Serv.	Footage
Allegheny	1	0	0	0	0	1	2,328
Armstrong	74	0	0	59	15	0	201,040
Beaver	1	0	0	0	1	0	1,640
Butler	2	0	0	2	0	0	3,393
Clarion	36	1	0	33	2	0	86,090
Clearfield	71	0	0	59	12	0	582,377
Elk	7	0	0	4	3	0	30,542
Erie	1	0	0	1	0	0	3,335
Fayette	4	0	0	3	1	0	13,320
Forest	14	0	0	6	8	0	22,599
Greene	4	0	0	0	2	2	1,258
Indiana	23	0	0	19	4	0	78,234
Jefferson	23	1	0	16	6	0	67,281
McKean	464	225	0	1	4	234	975,629
Potter	3	0	0	2	1	0	14,308
Tioga	1	0	0	0	1	0	1,408
Venango	16	12	0	0	2	2	15,046
Warren	15	12	0	0	0	3	11,899
Washington	13	5	0	2	4	2	31,467
Westmoreland	67	0	0	57	10	0	154,612
Total	840	256	0	264	76	244	2,297,806

PENNSYLVANIA
Wildcat Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Footage
Clearfield	5	0	0	4	1	38,658
Crawford	1	0	0	0	1	3,488
Elk	1	0	0	0	1	7,110
Erie	5	0	0	1	4	23,423
Jefferson	1	0	0	0	1	7,139
Potter	1	0	0	0	1	6,040
Susquehanna	1	0	0	0	1	5,538
Tioga	3	0	0	0	3	17,391
Warren	2	0	0	0	2	10,357
Total	20	0	0	5	15	119,144

SOUTH DAKOTA
Development Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Serv.	Footage
Harding	11	7	0	0	4	0	94,296
Total	11	7	0	0	4	0	94,296

1960 DRILLING BY COUNTIES

SOUTH DAKOTA
Wildcat Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Footage
Butte	1	0	0	0	1	1,214
Custer	2	0	0	0	2	1,561
Fall River	1	0	0	0	1	1,729
Harding	2	0	0	0	2	17,635
Perkins	1	0	0	0	1	6,980
Tripp	1	0	0	0	1	2,388
Ziebach	3	0	0	0	3	12,378
Total	11	0	0	0	11	43,885

TENNESSEE
Development Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Serv.	Footage
Pickett	4	3	0	0	1	0	1,219
Total	4	3	0	0	1	0	1,219

TENNESSEE
Wildcat Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Footage
Cannon	1	0	0	0	1	200
Clay	10	0	0	0	10	7,030
Davidson	2	0	0	0	2	1,709
Dickson	4	0	0	0	4	5,425
Fentress	9	1	0	0	8	8,235
Giles	2	0	0	0	2	2,214
Jackson	1	0	0	0	1	540
Macon	2	0	0	0	2	2,130
Moore	1	0	0	0	1	1,183
Overton	7	1	0	2	4	9,423
Perry	1	0	0	0	1	1,500
Pickett	21	4	0	0	17	18,969
Putnam	1	0	0	0	1	860
Robertson	7	0	0	0	7	5,886
Scott	4	1	0	0	3	6,070
Smith	1	0	0	0	1	180
Sumner	12	0	0	0	12	4,839
Trowsdale	1	0	0	0	1	350
White	1	0	0	0	1	1,000
Total	88	7	0	2	79	77,743

TEXAS
District 1
Development Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Serv.	Footage
Atascosa	32	18	3	1	8	2	147,369
Bastrop	4	2	0	0	2	0	17,961
Bell	1	0	0	0	0	1	2,260
Bexar	57	40	0	0	17	0	64,745
Caldwell	85	75	1	0	8	1	202,893
Dimmitt	57	37	0	6	14	0	203,342
Frio	24	14	0	3	6	1	83,621
Gonzales	4	0	0	0	3	1	15,296
Guadalupe	58	53	0	0	4	1	119,920
Kinney	1	1	0	0	0	0	3,980
LaSalle	20	4	2	5	9	0	134,015
Maverick	228	205	1	3	17	2	380,681
McMullen	61	26	11	5	19	0	290,265
Medina	23	14	0	0	8	1	38,083
Milam	15	8	0	0	7	0	14,491
Travis	8	1	0	0	7	0	8,083
Uvalde	10	0	0	4	6	0	19,717
Val Verde	1	1	0	0	0	0	438
Wilson	40	21	0	2	17	0	69,834
Zavala	12	6	0	1	5	0	48,474
Total	741	526	18	30	157	10	1,865,468

TEXAS
District 1
Wildcat Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Footage
Atascosa	15	2	0	0	13	52,267
Bandera	1	0	0	0	1	11,906
Bastrop	8	0	0	0	8	5,446

TEXAS District 1 (Continued)

County—	Total	Crude	Cond.	Gas	Dry	Footage
Bell	1	0	0	0	1	1,120
Bexar	6	0	0	0	6	9,018
Burnett	3	0	0	0	3	5,240
Caldwell	6	0	0	0	6	18,272
Dimmitt	26	0	0	1	25	109,968
Edwards	3	0	0	0	3	10,545
Frio	2	0	0	0	2	12,655
Gonzales	21	0	0	0	21	110,466
Guadalupe	10	0	0	0	10	21,136
Kerr	1	0	0	0	1	4,218
Kimble	3	0	0	0	3	12,074
Kinney	44	0	0	0	44	37,706
LaSalle	17	1	0	0	16	107,561
Maverick	46	0	0	1	45	90,619
McMullen	45	1	1	1	42	214,242
Medina	10	0	0	0	10	14,474
Milam	8	1	0	0	7	28,638
Travis	13	0	0	0	13	10,965
Uvalde	9	0	0	2	7	18,651
Val Verde	4	0	0	0	4	12,644
Williamson	7	0	0	0	7	9,275
Wilson	31	0	0	0	31	58,297
Zavala	45	2	0	0	43	170,906
Total	385	7	1	5	372	1,158,309

TEXAS
District 2
Development Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Serv.	Footage
Bee	46	6	13	12	15	0	226,447
Calhoun	57	7	28	12	10	0	466,634
DeWitt	42	9	16	1	16	0	377,789
Goliad	40	3	7	17	13	0	230,373
Jackson	108	26	23	18	40	1	705,806
Karnes	50	36	2	0	12	0	509,320
Lavaca	14	0	2	9	3	0	86,186
Live Oak	52	8	8	8	28	0	296,232
Refugio	105	62	5	19	19	0	583,202
Victoria	58	12	5	25	16	0	297,482
Total	572	169	109	121	172	1	3,779,471

TEXAS
District 2
Wildcat Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Footage
Bee	27	1	0	2	24	155,017
Calhoun	10	0	2	0	8	97,594
DeWitt	14	1	3	0	10	117,886
Goliad	9	0	0	0	9	62,913
Jackson	30	0	0	2	28	202,740
Karnes	24	1	2	0	21	193,655
Lavaca	9	0	1	0	8	83,224
Live Oak	38	2	1	1	34	235,391
Refugio	12	0	1	1	10	78,156
Victoria	13	1	1	1	10	83,503
Total	184	6	11	5	162	1,310,079

TEXAS
District 3
Development Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Serv.	Footage
Austin	20	12	2	0	6	0	106,014
Brazoria	67	29	8	1	29	0	379,889
Brazos	2	0	0	2	0	0	5,964
Chambers	44	18	11	1	13	1	397,753
Colorado	32	1	16	3	12	0	262,240
Fayette	1	0	0	0	1	0	2,005
Fort Bend	55	30	3	0	22	0	211,256
Galveston	84	49	9	1	25	0	678,620
Grimes	1	0	0	0	1	0	3,759
Hardin	85	55	4	1	25	0	326,611
Harris	105	65	2	5	33	0	369,646
Jasper	10	1	1	0	8	0	95,996
Jefferson	95	37	31	1	26	0	773,750
Liberty	92	52	2	1	37	0	541,038
Madison	2	1	0	0	1	0	25,025
Matagorda	113	45	28	2	38	0	1,031,641

1960 DRILLING BY COUNTIES

TEXAS District 3 (Continued)

County—	Total	Crude	Cond.	Gas	Dry	Serv.	Footage
Montgomery	8	1	3	2	2	0	66,521
Newton	29	15	4	0	10	0	287,538
Orange	20	12	3	0	5	0	132,988
Polk	5	4	1	0	0	0	33,254
San Jacinto	6	0	0	0	6	0	50,551
Tyler	3	2	0	0	1	0	18,675
Waller	2	1	0	0	1	0	14,090
Washington	8	7	0	1	0	0	12,461
Wharton	56	10	3	21	22	0	300,908
Total	945	447	131	42	324	1	6,128,193

TEXAS
District 3

Wildcat Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Footage
Austin	5	0	0	0	5	48,597
Brazoria	17	1	1	1	14	189,917
Brazos	3	0	0	1	2	11,039
Chambers	16	0	0	0	16	141,420
Colorado	13	0	2	0	11	108,565
Fayette	3	0	0	0	3	17,814
Fort Bend	10	0	0	0	10	85,478
Galveston	8	0	1	0	7	70,055
Grimes	1	0	0	0	1	3,815
Hardin	14	0	1	0	13	130,594
Harris	6	1	2	0	3	54,604
Jasper	3	1	0	0	2	28,519
Jefferson	22	1	1	0	20	238,336
Lee	1	1	0	0	0	12,249
Liberty	14	1	0	0	13	132,742
Madison	1	1	0	0	0	9,652
Matagorda	36	1	2	0	33	355,618
Montgomery	4	0	0	0	4	37,067
Newton	7	1	0	0	6	61,519
Orange	5	1	0	0	4	50,791
Polk	1	0	0	0	1	13,004
San Jacinto	2	0	0	0	2	13,633
Trinity	1	0	0	0	1	12,534
Tyler	6	0	1	0	5	55,476
Walker	2	0	0	0	2	15,153
Waller	1	0	0	0	1	9,587
Washington	2	0	0	0	2	21,272
Wharton	14	1	2	0	11	85,286
Total	218	11	13	2	192	2,014,338

TEXAS
District 4

Development Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Serv.	Footage
Aransas	10	7	1	0	2	0	60,655
Brooks	15	3	3	0	9	0	101,739
Cameron	4	0	0	2	2	0	32,581
Duval	157	58	4	26	61	8	546,234
Hidalgo	90	6	54	7	23	0	751,789
Jim Hogg	76	58	3	7	8	0	341,527
Jim Wells	59	11	14	12	22	0	327,681
Kenedy	3	0	1	1	1	0	30,680
Kleberg	39	18	13	2	6	0	353,359
Nueces	57	23	4	6	24	0	372,332
San Patricio	58	25	5	12	16	0	365,572
Starr	93	29	26	13	25	0	497,561
Webb	63	15	5	9	34	0	213,106
Willacy	9	4	0	0	4	1	66,164
Zapata	39	7	2	11	17	2	164,028
Total	772	264	135	108	254	11	4,225,008

TEXAS
District 4

Wildcat Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Footage
Aransas	4	0	0	0	4	36,801
Brooks	6	0	1	0	5	39,513
Cameron	11	0	0	2	9	98,810
Duval	52	1	1	5	45	267,848

TEXAS District 4 (Continued)

County—	Total	Crude	Cond.	Gas	Dry	Footage
Hidalgo	23	0	6	0	17	216,863
Jim Hogg	10	0	0	2	8	51,648
Jim Wells	24	1	2	1	20	124,854
Kenedy	5	0	0	0	5	50,437
Kleberg	7	0	1	0	6	62,105
Nueces	25	2	1	1	21	171,911
San Patricio	23	1	2	0	20	156,535
Starr	35	2	3	1	29	106,260
Webb	53	3	0	0	50	253,825
Willacy	2	0	0	0	2	24,568
Zapata	22	0	0	1	21	72,902
Total	302	10	17	13	262	1,734,880

EAST TEXAS
Districts 5 and 6

Development Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Serv.	Footage
Anderson	79	45	5	2	24	3	309,240
Angelina	3	0	0	0	3	0	16,676
Camp	1	0	0	0	1	0	8,226
Cass	30	25	1	0	4	0	197,692
Cherokee	19	5	1	0	13	0	94,372
Ellis	34	33	0	0	1	0	19,790
Falls	5	1	0	1	3	0	7,077
Franklin	8	1	6	0	1	0	90,388
Freestone	40	12	13	0	15	0	198,453
Gregg	39	25	7	0	7	0	210,768
Harrison	126	110	12	0	3	1	472,501
Henderson	12	1	2	1	8	0	90,333
Hill	5	0	0	0	5	0	6,343
Hopkins	2	0	0	0	2	0	14,197
Houston	11	0	1	1	9	0	79,848
Kaufman	3	0	0	0	3	0	10,700
Leon	12	5	3	0	3	1	70,149
Limestone	25	9	6	0	10	0	112,303
McLennan	2	1	0	0	1	0	920
Marion	19	13	0	0	6	0	111,103
Natchitoches	2	2	0	0	0	0	723
Navarro	118	87	0	0	31	0	118,990
Panola	44	33	3	0	7	1	194,450
Rains	1	0	0	0	1	0	9,154
Red River	5	1	0	0	4	0	17,499
Robertson	2	0	0	1	1	0	3,743
Rusk	148	119	14	0	15	0	707,350
Shelby	4	3	0	0	1	0	11,609
Smith	83	60	4	0	16	3	652,592
Titus	57	49	0	0	8	0	228,060
Upshaw	48	34	0	0	14	0	181,541
Van Zandt	9	7	0	0	2	0	54,133
Wood	42	29	6	0	6	1	329,683
Total	1,038	710	84	6	228	10	4,630,606

EAST TEXAS
Districts 5 and 6

Wildcat Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Footage
Anderson	29	4	0	0	25	170,331
Bowie	2	0	0	0	2	15,428
Camp	1	0	0	0	1	13,002
Cass	8	1	2	0	5	81,737
Cherokee	14	0	0	0	14	68,214
Delta	6	0	1	0	5	32,684
Ellis	4	0	0	0	4	9,269
Falls	1	0	0	0	1	2,700
Fannin	1	0	0	0	1	1,112
Franklin	4	0	0	0	4	17,710
Freestone	10	0	0	0	10	42,070
Harrison	8	0	1	0	7	32,183
Henderson	7	0	0	0	7	34,339
Hill	4	0	0	0	4	13,240
Hopkins	8	0	0	0	8	38,184
Houston	10	0	0	0	10	63,694
Hunt	6	0	1	0	5	43,389
Johnson	1	0	0	0	1	8,964
Kaufman	4	0	0	0	4	12,531
Lamar	2	0	0	0	2	3,618
Leon	12	0	1	0	11	85,701
Limestone	12	0	0	0	12	53,597

1960 DRILLING BY COUNTIES

TEXAS Districts 5 and 6 (Continued)

County—	Total	Crude	Cond.	Gas	Dry	Footage
Marion	3	0	0	0	3	11,051
Morris	4	0	0	0	4	30,168
Navarro	22	0	0	0	22	62,457
Panola	3	0	0	0	3	22,340
Red River	11	0	0	0	11	34,797
Robertson	3	0	0	0	3	11,848
Rusk	7	1	1	0	5	47,206
San Augustine	4	0	0	0	4	11,085
Shelby	10	0	0	0	10	52,426
Smith	21	0	0	0	21	123,387
Titus	9	1	0	0	8	42,848
Upshur	8	0	0	0	8	29,892
Van Zandt	5	1	0	0	4	46,969
Wood	9	0	1	0	8	68,033
Total	273	8	8	0	257	1,438,204

TEXAS
District 7-B
Development Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Serv.	Footage
Brown	80	60	1	4	15	0	110,361
Callahan	177	107	0	2	59	9	231,436
Coleman	119	77	1	11	30	0	316,909
Comanche	17	6	0	3	7	1	27,942
Eastland	25	15	1	1	8	0	57,138
Erath	32	0	4	27	1	0	108,608
Fisher	26	15	0	2	6	3	126,336
Haskell	139	93	1	0	42	3	631,533
Jones	138	92	0	0	42	4	432,888
Nolan	37	25	0	0	10	2	207,713
Palo Pinto	47	19	10	5	13	0	129,542
Parker	26	1	5	12	8	0	109,478
Shackelford	305	173	0	2	123	7	414,694
Stephens	65	30	2	10	23	0	214,608
Stonewall	63	41	0	0	20	2	246,484
Taylor	231	152	0	0	74	5	849,559
Throckmorton	73	39	1	1	31	1	232,982
Total	1,600	945	26	80	512	37	4,448,211

TEXAS
District 7-B
Wildcat Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Footage
Brown	24	6	0	2	16	54,168
Callahan	63	3	0	0	60	227,681
Coleman	39	1	0	0	38	103,372
Comanche	6	0	0	0	6	12,885
Coryell	2	0	0	0	2	6,062
Eastland	12	3	0	0	9	32,334
Erath	2	0	0	0	2	7,863
Fisher	13	2	0	0	11	66,375
Hamilton	3	0	0	0	3	10,000
Haskell	39	2	0	0	37	175,745
Jones	68	6	0	0	62	209,771
Mills	2	0	0	0	2	4,356
Nolan	12	2	0	0	10	74,945
Palo Pinto	30	0	1	11	18	112,420
Parker	14	0	3	4	7	67,037
San Saba	4	0	0	0	4	7,663
Shackelford	104	6	0	3	95	87,892
Somervell	1	0	0	0	1	1,201
Stephens	17	4	0	1	12	67,392
Stonewall	26	1	0	0	25	118,485
Taylor	110	15	0	5	90	359,946
Throckmorton	40	2	0	0	38	139,866
Total	631	53	4	26	548	1,947,459

TEXAS
Districts 7-C and 8
Development Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Serv.	Footage
Andrews	422	399	1	0	22	0	2,970,923
Borden	49	40	0	0	9	0	409,916
Cochran	32	29	0	2	1	0	159,031

TEXAS Districts 7-C and 8 (Continued)

County—	Total	Crude	Cond.	Gas	Dry	Serv.	Footage
Coke	6	3	0	0	3	0	32,891
Crane	226	204	2	0	19	1	1,080,416
Crockett	115	85	4	7	19	0	291,718
Crosby	8	5	0	0	2	1	29,184
Culberson	18	12	0	0	6	0	73,578
Dawson	36	32	0	0	4	0	294,033
Dickens	2	0	0	0	2	0	9,557
Ector	375	352	0	0	20	3	2,002,611
Gaines	135	106	0	6	23	0	935,406
Garza	70	56	0	0	14	0	295,991
Glasscock	18	6	0	0	12	0	55,892
Hockley	40	30	0	0	9	1	278,984
Howard	92	78	0	0	14	0	298,918
Irion	43	20	0	1	22	0	104,517
Kent	10	4	0	0	6	0	56,704
Kimble	2	0	1	0	1	0	12,638
King	6	1	0	0	5	0	22,329
Lamb	7	6	0	0	1	0	30,637
Loving	75	64	0	0	11	0	337,588
Lubbock	8	6	0	0	1	1	46,054
Lynn	13	8	0	0	4	1	62,487
McCulloch	2	1	0	0	0	1	4,345
Martin	22	16	2	0	4	0	217,831
Menard	15	13	0	0	2	0	53,296
Midland	82	37	43	0	1	1	804,159
Mitchell	57	52	0	0	4	1	142,924
Motley	9	9	0	0	0	0	37,817
Pecos	193	114	10	12	47	10	637,735
Reagan	57	57	0	0	0	0	364,136
Reeves	65	40	13	3	8	1	231,968
Runnels	98	58	0	3	34	3	377,896
Schleicher	27	13	1	7	6	0	136,488
Scurry	84	69	0	0	15	0	351,740
Sterling	15	12	0	0	3	0	38,544
Sutton	3	0	2	0	1	0	13,944
Terrell	2	0	1	1	0	0	29,300
Terry	9	7	0	0	2	0	49,233
Tom Green	36	23	0	0	13	0	149,324
Upton	152	136	4	0	12	0	791,446
Ward	189	126	0	2	16	45	594,114
Winkler	258	169	18	5	22	44	1,171,690
Yoakum	161	148	0	0	13	0	990,187
Total	3,344	2,646	102	49	433	114	17,080,120

TEXAS
Districts 7-C and 8
Wildcat Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Footage
Andrews	13	6	0	0	7	92,953
Borden	6	1	0	0	5	47,004
Cochran	9	0	0	0	9	48,292
Coke	15	2	0	0	13	82,320
Concho	12	0	1	0	11	33,560
Cottle	1	0	0	0	1	7,770
Crane	16	2	0	0	14	76,877
Crockett	26	0	0	1	25	104,045
Crosby	2	1	0	0	1	13,378
Culberson	6	0	0	1	5	20,736
Dawson	9	3	0	0	6	87,698
Dickens	23	0	0	0	23	24,185
Ector	4	2	0	0	2	28,632
Gaines	8	2	0	0	6	82,025
Garza	7	1	0	0	6	37,114
Glasscock	8	0	0	0	8	23,165
Hockley	8	1	0	0	7	55,936
Howard	8	2	0	0	6	60,300
Irion	24	2	0	0	22	47,996
Jeff Davis	1	0	0	0	1	2,400
Kent	38	3	0	0	35	134,408
Kimble	7	0	0	1	6	15,072
King	15	0	0	0	15	82,222
Lamb	3	0	0	0	3	17,081
Loving	10	0	0	0	10	50,504
Lubbock	8	0	0	0	8	44,877
Lynn	8	0	0	0	8	42,283
McCulloch	4	0	0	3	1	6,381
Martin	4	3	0	0	1	45,295
Menard	16	1	0	0	15	48,368
Midland	2	0	0	0	2	17,932
Mitchell	8	1	0	0	7	28,195
Motley	3	0	0	0	3	15,667
Pecos	74	2	1	2	69	282,901

BETTER COATINGS THROUGH RESEARCH

RESEARCH EFFORT: ***To continue improving Plasticap coatings and application methods.***

RESULTS: ***A series of successfully completed research projects and an expanded research program. Here are some of these results:***

- Additional new research facilities and personnel have been added recently to augment the continuous research program conducted for years by Plastic Applicators and independent research organizations under contract to Plastic Applicators. Man hours and dollars devoted to research have been constantly increased.

- New coatings developed through this research program have been introduced regularly. Most recent new coating released from the laboratories is Plasticap HTP, which was developed to provide lasting resistance to acids and caustics, even at temperatures above 350°F.

- Air dehydrators have been installed at all Plastic Applicators plants because research has shown that removing all water, oil, and other impurities from air used in the application of Plasticap coatings improves adhesion and resistance qualities of the coatings.

PROTECT YOURSELF AND YOUR PIPE. SPECIFY PLASTICAP. MORE TUBULAR GOODS ARE PROTECTED WITH PLASTICAP THAN ANY OTHER COATING.

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1960 DRILLING BY COUNTIES

TEXAS Districts 7-C and 8 (Continued)

County—	Total	Crude	Cond.	Gas	Dry	Footage
Reagan	2	0	1	0	1	13,931
Reeves	32	0	3	0	29	110,366
Runnels	79	11	0	1	67	299,544
Schleicher	16	2	0	0	14	76,793
Scurry	11	0	0	0	11	72,057
Sterling	13	0	0	0	13	51,482
Sutton	2	0	0	0	2	10,350
Terrell	2	0	0	0	2	17,208
Terry	8	0	0	0	8	63,209
Tom Green	31	0	0	0	31	137,220
Upton	6	0	0	0	6	51,885
Ward	10	2	0	0	8	53,812
Winkler	6	1	0	0	5	47,272
Yoakum	8	1	0	0	7	56,029
Total	632	52	6	9	565	2,868,730

TEXAS
District 9

Development Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Serv.	Footage
Archer	534	323	0	1	151	59	945,942
Baylor	126	66	0	0	57	3	211,258
Clay	119	75	0	0	21	23	217,498
Cooke	187	118	0	0	62	7	465,458
Denton	9	1	3	1	3	1	25,172
Foard	18	9	0	0	9	0	90,507
Grayson	34	24	2	0	7	1	193,376
Hardeman	2	2	0	0	0	0	16,177
Jack	109	56	7	6	32	8	385,339
Knox	133	75	0	0	56	2	265,685
Montague	85	60	0	0	18	7	205,300
Wichita	414	276	0	0	90	48	671,625
Wilbarger	267	158	0	0	71	38	571,107
Wise	150	73	30	22	25	0	798,741
Young	232	142	1	0	86	3	588,999
Total	2,419	1,458	43	30	688	200	5,652,184

TEXAS
District 9

Wildcat Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Footage
Archer	39	11	0	0	28	166,212
Baylor	33	0	0	0	33	73,840
Clay	13	5	0	0	8	50,950
Cooke	76	2	0	0	74	251,377
Denton	11	0	0	1	10	30,744
Foard	87	0	0	0	87	163,131
Grayson	10	0	2	0	8	84,545
Hardeman	41	0	0	0	41	76,094
Jack	27	7	0	0	20	95,168
Knox	34	0	0	0	34	107,655
Montague	14	2	0	0	12	54,515
Wichita	8	0	0	0	8	24,726
Wilbarger	35	1	0	0	34	139,888
Wise	5	0	0	0	5	25,225
Young	51	13	0	0	38	187,900
Total	484	41	2	1	440	1,531,970

TEXAS
District 10

Development Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Serv.	Footage
Carson	118	82	0	15	19	2	378,088
Collingsworth	48	1	0	35	12	0	132,499
Dallam	7	0	1	1	5	0	25,049
Gray	152	94	1	30	19	8	437,384
Hansford	68	13	25	10	19	1	466,399
Hemphill	2	1	1	0	0	0	15,610
Hutchinson	251	212	4	23	8	4	797,361
Lipscomb	37	15	10	2	10	0	298,238
Moore	30	10	0	13	6	1	86,747
Ochiltree	149	62	46	20	20	1	1,271,651

TEXAS District 10 (Continued)

County—	Total	Crude	Cond.	Gas	Dry	Serv.	Footage
Potter	16	0	0	11	5	0	41,166
Roberts	13	1	6	5	1	0	69,339
Sherman	18	0	1	8	9	0	55,388
Wheeler	75	34	0	29	6	6	158,259
Total	984	525	95	202	139	23	4,233,170

TEXAS
District 10

Wildcat Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Footage
Carson	3	0	0	1	2	12,188
Castro	1	0	0	0	1	8,682
Childress	2	0	0	0	2	10,382
Dallam	6	0	0	0	6	36,194
Hall	2	0	0	0	2	10,410
Hansford	2	0	0	0	2	14,998
Hartley	2	0	0	0	2	13,443
Hemphill	3	0	0	1	2	31,911
Hutchinson	3	0	0	0	3	19,366
Lipscomb	8	0	0	0	8	77,298
Ochiltree	12	2	2	0	8	99,072
Oldham	2	0	0	0	2	19,824
Potter	1	0	0	1	0	4,510
Randall	2	0	0	0	2	16,409
Roberts	5	0	0	0	5	46,160
Sherman	1	0	0	0	1	8,216
Swisher	2	0	0	0	2	17,335
Total	57	2	2	3	50	446,398

UTAH

Development Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Serv.	Footage
Grand	7	0	0	4	3	0	35,643
San Juan	102	86	0	0	15	1	582,776
Uintah	37	25	0	10	2	0	222,931
Washington	1	0	0	0	1	0	700
Total	147	111	0	14	21	1	842,050

UTAH

Wildcat Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Footage
Boxelder	1	0	0	0	1	800
Carbon	1	0	0	1	0	4,500
Duchesne	9	1	0	0	8	58,800
Emery	4	0	0	0	4	17,954
Garfield	2	0	0	0	2	8,452
Grand	16	0	0	4	12	80,885
Juab	1	0	0	0	1	7,526
Kane	2	0	0	0	2	17,658
Sanpete	1	0	0	0	1	4,568
San Juan	32	5	0	0	27	196,144
Summit	2	0	0	0	2	4,109
Uintah	18	0	0	4	14	113,917
Washington	1	0	0	0	1	3,000
Wayne	5	0	0	0	5	21,857
Weber	1	0	0	0	1	610
Total	96	6	0	9	81	540,780

VIRGINIA

Development Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Serv.	Footage
Buchanan	5	0	0	5	0	0	24,740
Dickenson	2	0	0	2	0	0	9,896
Wise	1	0	0	1	0	0	4,948
Total	8	0	0	8	0	0	39,584

THE QUALITY OF THINKING

From an almost unlimited scope of thought, Leonardo da Vinci brought forth a stream of inventions which — in modern form — are in use today. However, Leonardo's greatest contribution was simply the triumph of creative thought applied to practical results. His work will stand for all time as proof that the appraisal of quality applies to thinking as well as to tangible objects and to visible or audible processes.

In a related sense, the quality of engineering is measured by results. And it is by results alone that the minds responsible for an engineering project can be evaluated. When you check the record of Brown & Root's engineering through the years, the high quality of thinking is self-evident. Customer satisfaction from greater efficiency at lower costs has built a worldwide reputation for engineering and construction by Brown & Root.

This squirrel-cage blower, invented by Leonardo da Vinci and put to practical use, was a significant step toward modern mechanical air conditioning.

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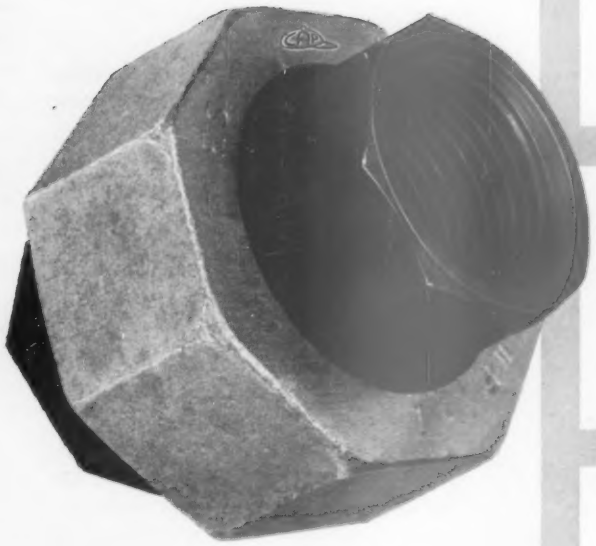

4-WAY JOB INSURANCE

Capitol forged steel unions have built-in insurance to give 4-way trouble-free service!

(1) *Leak-proof connections* assured because Capitol unions have *more* threads, accurately cut and double-checked according to Army-Navy gauging practice. Both hand-tight and pressure-tight threads are checked, two operations instead of the one required for American Standard gauging. The extra threads mean on-the-job assurance of tight installations. (2) *Positive seating* because each union is individually pressure-tested. (3) *Clean/over-all protection*, each male and female part completely phosphate coated; each nut electro-zinc plated. (4) *Easy wrenching/faster make-up* because all three parts have a definite octagon shape.

You get all 4 important advantages at no extra cost when you specify CAPITOL forged steel unions . . . one of the full-line of Army-Navy gauged forged steel fittings.

Now more than one million in service and not a single failure.

CAPITOL MANUFACTURING CO.,
Division of Harsco Corporation, Columbus, Ohio.

1
LEAK-PROOF CONNECTIONS

2
POSITIVE SEATING

3
CLEAN/OVER-ALL PROTECTION

4
EASY WRENCHING/FAST MAKE-UP

CAPITOL

SPECIFY CAP FOR ALL FITTINGS

SOLD ONLY THROUGH RECOGNIZED DISTRIBUTORS

1960 DRILLING BY COUNTIES

WEST VIRGINIA

Development Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Serv.	Footage
Barbour	4	0	0	4	0	0	17,069
Boone	9	1	0	7	1	0	29,535
Braxton	4	0	0	2	2	0	8,425
Calhoun	74	14	0	59	1	0	151,250
Clay	30	4	0	24	2	0	52,845
Doddridge	107	14	0	80	13	0	204,500
Fayette	5	0	0	5	0	0	12,451
Gilmer	44	5	0	37	2	0	88,488
Harrison	2	0	0	2	0	0	6,053
Jackson	8	0	0	6	2	0	34,740
Kanawha	34	1	0	33	0	0	85,263
Lewis	141	3	0	129	9	0	318,127
Lincoln	13	4	0	6	3	0	33,168
Logan	18	1	0	14	3	0	52,232
McDowell	8	0	0	8	0	0	36,179
Marion	1	0	0	0	0	1	2,071
Marshall	24	0	0	2	0	22	49,522
Mingo	33	0	0	28	5	0	116,654
Monongalia	5	0	0	5	0	0	7,460
Nicholas	10	0	0	7	3	0	18,856
Pleasants	7	2	0	2	2	1	14,452
Preston	3	0	0	1	0	2	15,916
Putnam	3	0	0	2	1	0	14,181
Raleigh	8	0	0	6	2	0	25,800
Ritchie	82	12	0	55	15	0	168,195
Roane	27	5	0	18	4	0	53,169
Tyler	9	2	0	4	3	0	22,492
Upshur	25	0	0	25	0	0	104,939
Wayne	94	6	0	81	7	0	224,765
Webster	1	0	0	1	0	0	3,608
Wetzel	7	3	0	3	1	0	19,161
Wirt	8	1	0	6	1	0	14,194
Wyoming	25	0	0	20	5	0	77,423
Total	873	78	0	682	87	26	2,083,183

WEST VIRGINIA

Wildcat Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Footage
Greenbrier	1	0	0	0	1	6,150
Pendleton	1	0	0	0	1	13,001
Pocahontas	1	0	0	0	1	7,400
Preston	2	0	0	1	1	12,180
Randolph	4	0	0	2	2	25,963
Ritchie	1	0	0	0	1	7,268
Tucker	1	0	0	1	0	6,004
Total	11	0	0	4	7	77,966

WYOMING

Development Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Serv.	Footage
Big Horn	16	12	0	0	4	0	71,651
Campbell	71	56	0	0	15	0	499,981
Carbon	9	6	0	0	3	0	36,975
Converse	12	8	0	0	4	0	59,511
Crook	72	51	0	1	20	0	411,479
Fremont	15	7	0	0	8	0	42,015
Hot Springs	29	22	0	0	7	0	103,884
Johnson	32	30	0	0	2	0	162,659
Laramie	1	1	0	0	0	0	7,422
Lincoln	7	0	0	7	0	0	50,340
Natrona	44	26	0	1	17	0	139,104
Niobrara	8	4	0	0	4	0	7,548
Park	39	32	0	0	4	3	194,896
Sublette	54	26	0	22	6	0	227,207
Sweetwater	137	110	0	16	11	0	678,957
Washakie	6	4	0	0	1	1	19,661
Weston	87	57	0	0	26	4	350,103
Total	639	452	0	47	132	8	3,063,393

WYOMING

Wildcat Completions by Counties

County—	Total	Crude	Cond.	Gas	Dry	Footage
Albany	4	0	0	0	4	8,227
Big Horn	15	4	0	0	11	48,995
Campbell	56	5	0	0	51	416,050
Carbon	23	0	1	3	20	142,196
Converse	6	0	0	0	6	41,840
Crook	63	5	0	1	57	259,973
Fremont	36	2	0	1	33	147,907
Goshen	2	0	0	0	2	11,431
Hot Springs	6	0	0	0	6	26,272
Johnson	13	1	0	0	12	56,433
Lincoln	5	0	0	0	5	44,025
Natrona	37	3	1	0	33	165,378
Niobrara	28	1	0	0	27	186,873
Park	6	0	0	0	6	27,203
Platte	2	0	0	0	2	5,745
Sheridan	5	0	0	0	5	35,926
Sublette	20	2	0	1	17	129,809
Sweetwater	51	4	0	3	44	292,423
Uinta	1	0	0	0	1	4,319
Washakie	6	0	0	0	6	23,493
Weston	50	4	0	0	46	270,923
Total	435	31	2	8	394	2,345,441

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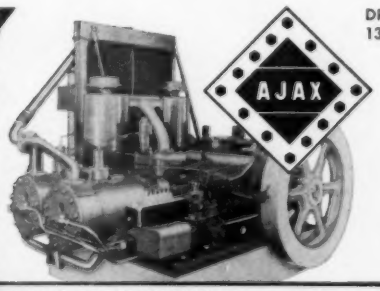

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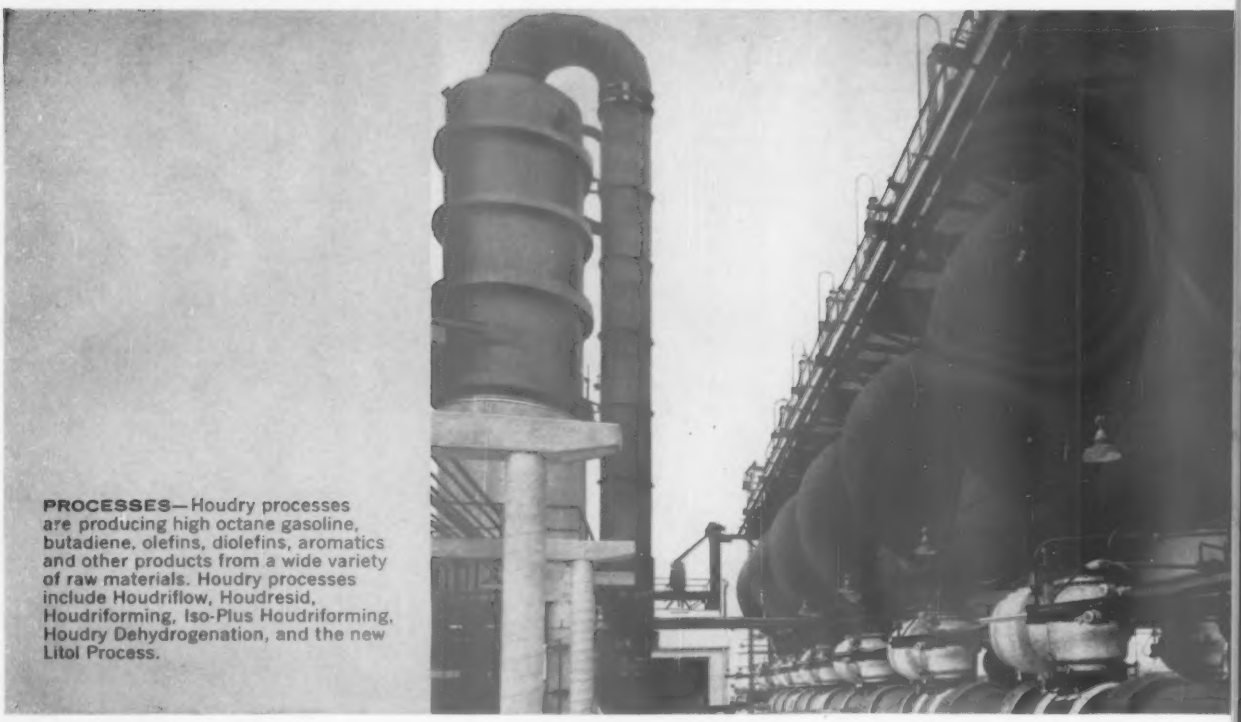
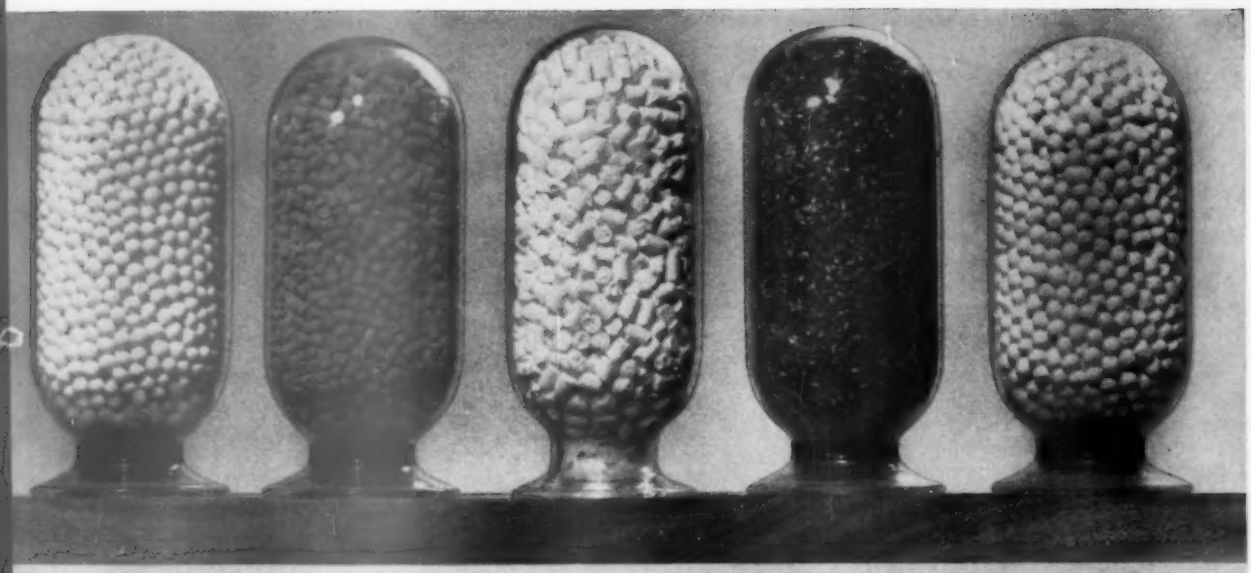
- The National Supply Co. — Pittsburgh, Pennsylvania
- Bethlehem Steel Co. — Supply Division, Tulsa, Oklahoma
- Mid-Continent Supply Co. — Fort Worth, Texas



PROCESSES—Houdry processes are producing high octane gasoline, butadiene, olefins, diolefins, aromatics and other products from a wide variety of raw materials. Houdry processes include Houdriflow, Houdresid, Houdriforming, Iso-Plus Houdriforming, Houdry Dehydrogenation, and the new Litol Process.

WHEN THE QUESTION IS CATALYSIS...THE ANSWER IS

CHEMICALS—Developmental work at Houdry has resulted in a number of commercially promising chemicals. They can be generally described as nitrogen containing organic types. More complete descriptions of their properties, typical uses, and possibilities may be obtained on request.



CATALYSTS—Houdry manufactures and supplies a wide range of catalysts for petroleum, petro-chemical and chemical processes. Custom catalysts are also manufactured to order.

HOUDRY

PROCESS CORPORATION

1528 Walnut Street, Philadelphia 2, Pa.

Houdry processes . . . catalysts . . . chemicals . . . services . . . are based on more than 30 years of experience in catalysis. For processors, this extensive experience in different-but-related areas of catalytic processing means unique benefits.

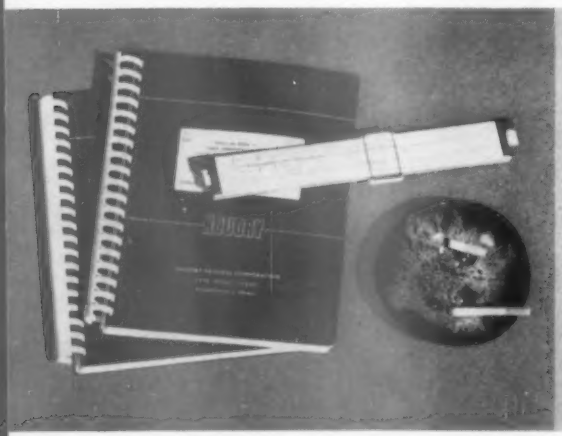
For instance, the catalyst buyer finds—often to his advantage—he is dealing not only with a catalyst manufacturer, but a company fully able to evaluate his process and help him utilize the catalyst more fully than might be possible otherwise.

Likewise, the processor who needs plant-operating assistance finds not only this, but wide experience in engineering and process design, as well.

Houdry process designs are improved by knowledge of catalyst behavior. Services are perfected by experience in continuing research on both processes and catalysts, and so it goes.

Thus the *total* of Houdry's broad experience adds value to specific Houdry products and services.

Today, as ever, here is proof, that Houdry means Progress . . . through Catalysis.



SERVICES—The wealth of experience Houdry has gained in petroleum and chemical processing is available to industry through Houdry services. These include Economic Consultation, Engineering, Research, and Technical Assistance—covering the entire range of catalytic processing.

BY W. L. NELSON, Technical Editor and Petroleum Consultant

COSTimating

No recession in construction costs

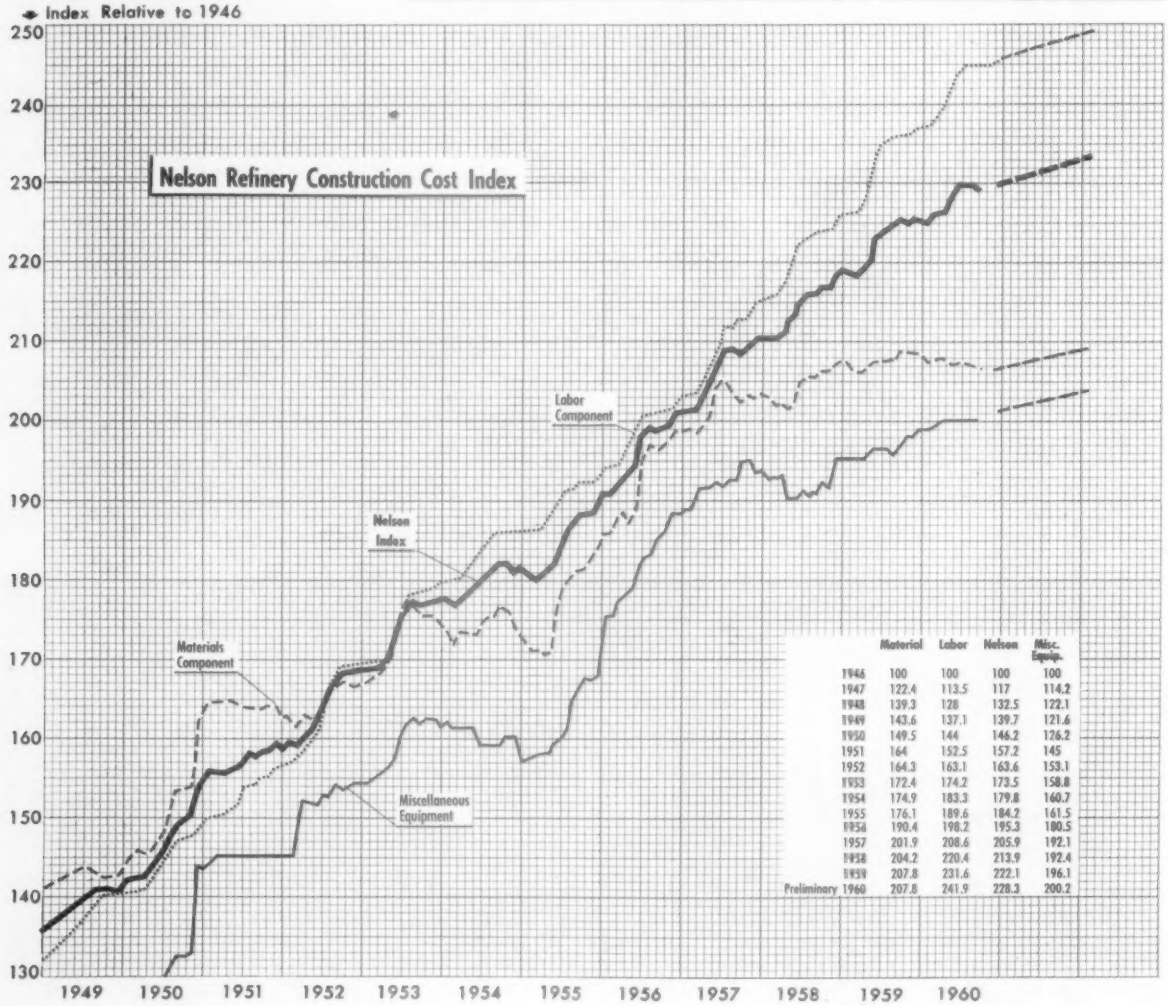
CONSTRUCTION COSTS have not risen as rapidly as in the past. The mild increase has been caused by decreases in material costs because labor costs have increased at the same extreme rate that has persisted since about 1956. A lower rate of wage increase is expected during 1961.

The Nelson Refinery Construction Cost Index is published in the first issue each month of The Oil and Gas Journal. It was described in the October 1, 1956, issue, page 110, and monthly values of the index have been tabulated in the issues of November 18, 1957, page 245 (1949-1956), and January 26, 1959, page 153 (1957 and 1958). A new complete tabulation will be published as soon as final 1960 data are available.

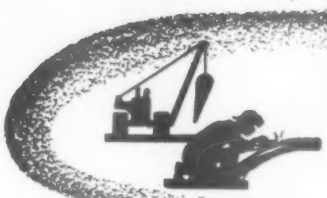
Monthly values of index for 1960

	Materials Component	Labor Component	Miscellaneous Equipment Average*	Nelson Construction Cost Index
January 1960	208.9	237.3	198.6	226.0
February	208.6	237.4	199.4	225.9
March	207.8	237.6	199.5	225.7
April	207.9	239.0	199.8	226.6
May	208.0	239.7	200.4	227.0
June	207.7	242.6	200.5	228.6
July	207.4	244.3	200.5	229.5
August	207.7	‡244.8	200.5	230.0
September	207.6	‡245.2	200.5	230.2
October	207.2	‡245.1	201.1	229.9
November	†207.2	‡245.1	†201.0	†229.9
December	†207.2	‡244.9	†201.0	†229.8
1960 Year	†207.8	241.9	†200.2	†228.3

*Used only in computing the materials component. †Preliminary. ‡In process of converting to a more representative basis of 60% rather than 50% skilled labor.



	Material	Labor	Nelson	Misc. Equip.
1946	100	100	100	100
1947	122.4	113.5	117	114.2
1948	139.3	128	132.5	122.1
1949	143.6	137.1	139.7	121.6
1950	149.5	144	146.2	126.2
1951	164	152.5	157.2	145
1952	164.3	163.1	163.6	153.1
1953	172.4	174.2	173.5	158.8
1954	174.9	183.3	179.8	160.7
1955	176.1	189.6	184.2	161.5
1956	190.4	198.2	195.3	180.5
1957	201.9	208.6	205.9	192.1
1958	204.2	220.4	213.9	192.4
1959	207.8	231.6	222.1	196.1
Preliminary 1960	207.8	241.9	228.3	200.2



Monthly Report on PIPELINE CONSTRUCTION

PIPELINE ACTIVITY reported here is compiled from surveys by The Oil and Gas Journal among pipeline companies and construction contractors.

This summary report appears in the last issue of The Journal each month. New construction projects are reported weekly in Pipeline Briefs in the Journal's news section.

Projects are listed in three groups—U. S., Canadian, and Foreign—and according to type of line—crude, products, natural gas, or miscellaneous.

★ The star symbol indicates the first appearance of the project in the Journal's survey.

U. S. Crude Oil Pipelines

CAPE PIPE LINE CO., (Sun Oil Co., Cities Service Co., Atlantic Refining Co.) Philadelphia.
Project: Line from lower Delaware Bay to Philadelphia.
Status: Proposed.

CONTINENTAL PIPE LINE CO., Drawer 1267, Ponca City, Okla.
Project: 32-mile line from South Dover, Mid Dover, and North Dover fields to existing line which takes crude from Crescent pool area, Logan County. Oklahoma.
Status: Under way.
Project: 4 miles of 3-in., 18 of 4-in., 123 of 6-in., 323 of 8-in., and 53 of 10-in., in new Glacier Pipe Line System from Cutbank, Mont., to Byron, Wyo.
Status: Under way.
Contractor: R. H. Fulton & Co., Lubbock, Tex.
Completion: August 31, 1961.
Project: 20 miles of 8-in. from Grand Isle to Golden Meadow, La.
Status: Under way.
Contractor: Glaser Construction Co., Inc., Lafayette, La.
Completion: February 25, 1961.

GILLETTE PIPELINE, INC., and A. W. HARTWIG, INC.
Project: A 102-mile line from Dead Horse Creek field to Casper, Wyo.
Status: Pending Wyoming Public Service Commission approval.

GREAT NORTHERN PIPE LINE CO., 175 East 4th St., St. Paul 1.
★ Project: 64-mile extension of system northwestward to the Lignite field, Burke County, North Dakota.
Status: Planned for 1961.

INTERNATIONAL OIL PIPELINE CORP., New York.
Project: Would own U. S. section of 1,500-mile, 30-in. line proposed by Mid-Continent Pipe Lines, Ltd., from Edmonton, Alta., to Chicago. (See Canada).
Status: Proposed.

MATADOR PIPE LINE CORP., Denver.
Project: 175-mile line from Burke, Bottineau, and Renville counties, North Dakota, to Cromer, Man.
Status: Pending approval of Canadian National Energy Board.

MID-AMERICA PIPELINE CO., Skelly Building, Tulsa.
Project: 405-mile, 10-in. condensate line from Superior, Wis., to Chicago. It would connect at Superior with the trunk line of Lakehead Pipe Line Co., eastern division of Interprovincial Pipe Line Co. Shipments would be fed into Interprovincial from gathering lines now under consideration in Alberta.
Status: Proposed.

NORTHWESTERN REFINING CO., Box 248, St. Paul Park, Minn.
Project: 4, 6, and 8-in. gathering lines in Glenburn field, Renville and Bottineau counties, North Dakota.
Status: Has state approval.

ROCK ISLAND OIL & REFINING CO., INC., 321 West Douglas Ave., Koch Building, Wichita 2, Kans.
Project: 60 miles of 6 and 7-in. from fields in Red Willow County, Nebraska, to Arapahoe Pipe Line's Colby, Kans., station.
Status: Under way.
Contractors: Gilmore Construction Co. Hays, Kans.; Plains Construction Co., Kimball, Neb.; and Barney Bridges Ardmore, Okla.
Completion: Spring 1961.

TETON PIPE LINE CORP., 1700 Broadway, Denver 2.
Project: 45 miles of 6-in. gathering and transmission line in Dead Horse Creek, Barber Creek, and Sussex fields in Campbell and Johnson counties, Wyoming, to connect with Service Pipe Line Co. facilities at Sussex.
Status: Approved by Wyoming Public Service Commission.

U. S. Products Pipelines

CALNEV PIPE LINE CO. (owned principally by Union Pacific Railroad Co., Union Pacific Building, Omaha, Neb.).
Project: 212 miles of 8-in. and 13 miles of 6-in. from Colton (near Los Angeles) to Las Vegas, Nev. The 225-mile line will carry gasoline, diesel fuel, and jet fuel, serving Victorville and Barstow, Calif., and Nellis Air Force base in Nevada.
Status: Under way.
Contractor: Williams Brothers, Tulsa, Okla.
Completion: March 1, 1961.

CARL M. LOEB, RHOADES & CO., 42 Wall St., New York 5.
★ Project: 75-mile, 20-in. line from New Jersey refineries to Long Island and its two big airports, Idlewild and La Guardia.
Status: Study being made by Gulf Interstate Co., Houston.

HUMBLE PIPE LINE CO., Box 2220, Houston.
★ Project: 11 miles of 4-in. LPG line from Baytown to Mont Belvieu, Tex.
Status: Planned.
Completion: June 1961.

NEW HAVEN PIPELINE, INC., 515 Madison Ave., New York 22, N. Y.
Project: 12-in. line from New Haven to Hartford, Conn., and 10-in. from there to Springfield, Mass., with a 6-in. spur to Westover Air Base at Ludlow, Mass.
Status: Proposed.

SEADRIFT PIPELINE CORP. (subsidiary of Union Carbide Corp., 270 Park Ave., New York 17).
Project: 56 miles of 6-in. from Bay City to Seadrift, Tex.
Status: Under way.
Contractor: Sharman, Allen, Gay & Taylor, Inc., Houston.
Completion: February 1961.

SOUTHERN PACIFIC PIPE LINES, INC., 65 Market St., San Francisco.
Project: 70-mile 8-in. jet-fuel line from Stockton to Castle Air Force Base near Atwater, Calif.
Contractor: Eastern Pipeline Contractors, Dallas.

TEXAS EASTERN TRANSMISSION CORP., Box 1189, Houston 1.
★ Project: 290-mile LPG line between South Louisiana and Mont Belvieu, Tex.
Status: Planned.

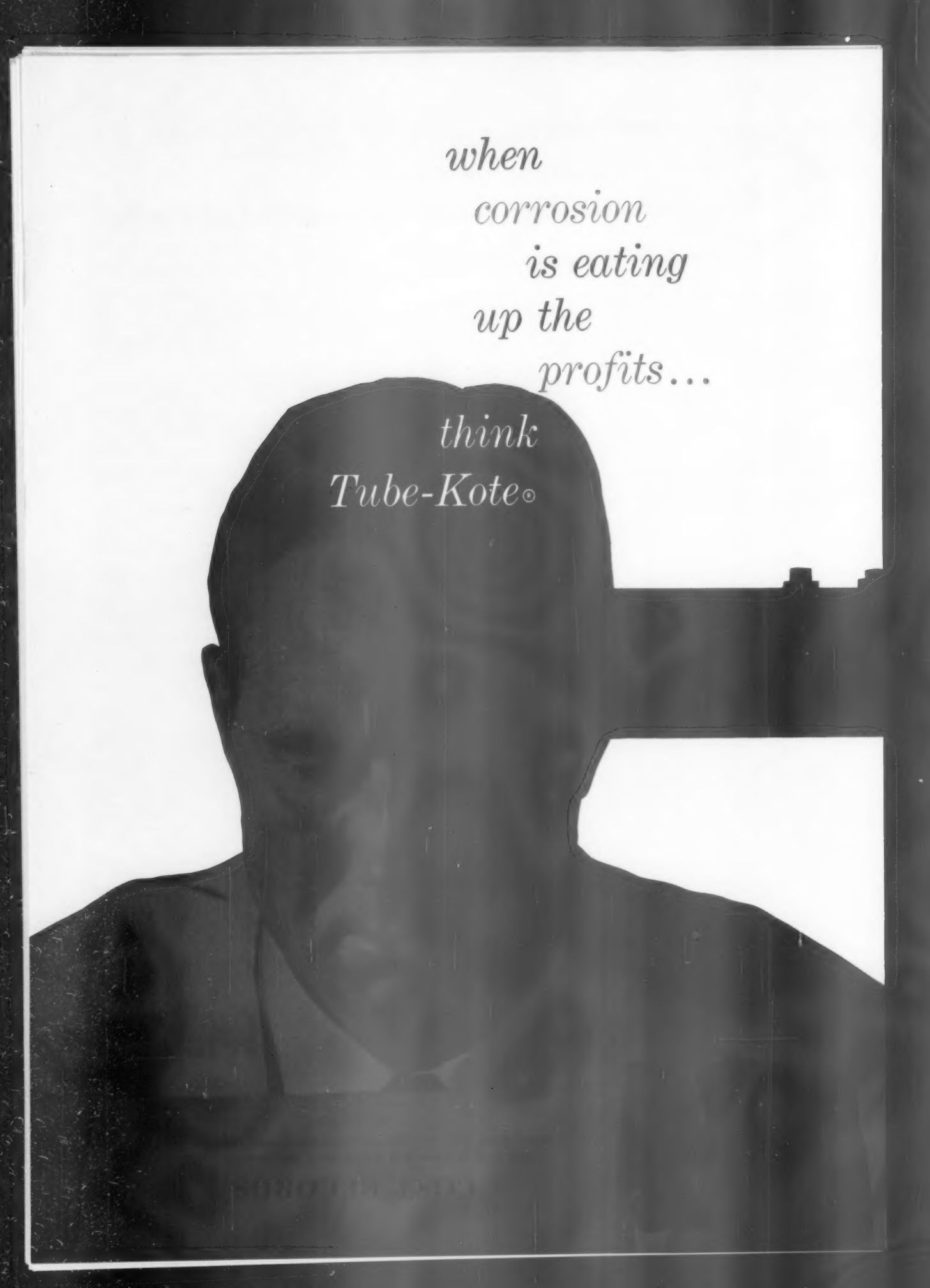
TRANS-SOUTHERN PIPELINE CORP. (subsidiary of Transcontinental Gas Pipe Line Corp., Box 296, Houston).
Project: 1,000 miles of 8 to 12-in. LPG line from Mont Belvieu, southeast of Houston, to Sanford, N. C., with spurs to Demopolis, Ala.; Hattiesburg, Miss.; and an area south of Baton Rouge.
Status: Planned, with target date for start of construction April 1961.
Completion: By August 1961.

WARREN PETROLEUM CORP., PHILLIPS PETROLEUM CO., UNION TEXAS NATURAL GAS CORP., and **TULOMA GAS PRODUCTS CO.**
Project: A 1,100-mile 8 to 10-in. propane line from the Houston area to North Carolina.
Status: Under consideration.

WEST SHORE PIPELINE CO. (Stock owned by Pure Oil Co. and Interstate Oil Pipe Line Co., a subsidiary of Standard Oil Co. of New Jersey).
Project: 200-mile line from Chicago to Milwaukee and Green Bay, Wis., with main line possibly 16-in. and laterals 12-in.
Status: Proposed. The line has backing of 10 oil companies.

U. S. Natural Gas Pipelines

ALASKA PIPE LINE CO., Houston, Tex.
Project: 74 miles from Kenai Unit gas field to Anchorage.
Status: Construction suspended until spring 1961.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OUR 22ND YEAR . . . THE INDUSTRY PIONEER

Congrats and $25 for this quip to M. H. Barber, Continental Oil Co., Big Spring, Texas.

"told him to pack the pump"

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PIPELINE CONSTRUCTION

Project: Extension of Kenai-Anchorage line to Fairbanks.
Status: Alaska Pipe Line Co. has ordered economic and engineering studies to determine feasibility of such a proposal.

ALGONQUIN GAS TRANSMISSION CO., 25 Faneuil Hall Square, Boston 9, Mass.
Project: 30 miles of line in Massachusetts.
Status: Approved by FPC.

ARKANSAS WESTERN GAS CO., Box 405, Fayetteville, Ark.
Project: New lines from Altus, Coal Hill, and Rock Creek fields to the main system.
Status: Approved by Arkansas Public Service Commission.

BORDER GAS TRANSMISSION CORP. (owned by Lehman Brothers, New York investment firm, and Rio Gas Gathering Co., 615 National Bank of Commerce Building, San Antonio 5, Tex.).
Project: Gathering lines in Starr, Zapata, Jim Hogg, Brooks, and Webb counties, Texas.
Status: Proposed.
Project: Gathering lines in Dimmit, Zavala, and La Salle counties, Texas.
Status: Proposed.

COASTAL STATES GAS PRODUCING CO., 200 Petroleum Tower, Corpus Christi, Tex. (Subsidiaries include Lo-Vaca Gathering Co. and South Texas Natural Gas Gathering Co.).
Project: 330 miles of various size pipe from Three Rivers area to southeast Lavaca County, Texas.
Completion: April 1, 1961.

COLORADO INTERSTATE GAS CO., Box 1087, Colorado Springs.
Project: 7 miles of 20-in. in Texas Panhandle.
Status: Pending FPC approval.
Completion: 1961.
Project: 109 miles of 26-in. from Texas Panhandle to southeastern Colorado; 134 miles of 34-in. from there to Pueblo, and 107 miles of 30-in. on to Denver.
Completion: 1961.
Project: 155 miles of 34-in. from Rock Springs, Wyo., to Provo, Utah, to connect with El Paso's proposed 395-mile line to California.
Status: Approved by FPC.
Completion: 1961.
Project: 32 miles of 6-in. from Central Colorado to Trinidad.
Status: Pending FPC approval.

COLORADO OIL & GAS CORP., Denver.
Project: 402-mile line from Gubik field to Fairbanks, Alaska.
Status: Proposed.

COLUMBIA GULF TRANSMISSION CO., Box 683, Houston 1.
★ Project: 97 miles of main-line loop and 29 miles of 12-in. lateral supply lines in Louisiana.
Status: Pending FPC approval.

EL PASO GAS SUPPLY CO. (subsidiary of El Paso Natural Gas Co., Box 1492, El Paso).
★ Project: 227 miles from Live Oak County to a plant in Sutton County.
Status: Pending FPC approval.

EL PASO NATURAL GAS CO., Box 1492, El Paso, Tex.
Project: 52 miles of 20-in. transmission from new plant in Terrell County to a line connection in Pecos County, Texas, plus 23 miles of various-size field line.
Status: Approved by FPC.
Project: 119 miles of 30-in. Permian-San Juan crossover loop.
Status: Pending FPC approval.
Completion: 1961.

PIPELINE CONSTRUCTION

Project: 17 miles of 30-in. near Spokane, Wash.
Status: Pending FPC approval.
Completion: Not known.
Project: 34 miles of 20-in. from Puckett tie-in to Goldsmith, Tex.
Status: Pending FPC approval.
Completion: 1961.
Project: 23 miles of 20-in. from Goldsmith to the Eunice-Plains line, and 395 miles of 34-in. from Thistle, Utah, to near Las Vegas, Nev.
Completion: 1961.
Project: Loop on the San Juan mainline, involving 27½ miles of 34-in.
Status: Pending FPC approval.
Completion: Not known.
Project: About 228 miles of 30-in. from Coquat to Sonora, Tex.
Status: Pending FPC approval.
Completion: Not known.

EQUITABLE GAS CO., 420 Boulevard of the Allies, Pittsburgh, Pa.
Project: 15 miles of 16-in. in Monongalia County, West Virginia, and Greene County, Pennsylvania.
Status: Approved by FPC.
Completion: October 1961.
Project: 6 miles of 20-in. in Greene County, Pennsylvania.
Status: Approved by FPC.
Completion: October 1961.
Project: 17 miles of 20-in. in Greene and Washington counties, Pennsylvania.
Status: Approved by FPC.
Completion: October 1962.

HOUSTON TEXAS GAS & OIL CORP., Box 10400, St. Petersburg 33, Fla.
Projects: 196 miles of 2 to 6-in. in various parts of Florida.
Status: Pending.

LONE STAR GAS CO., 301 South Harwood St., Dallas 1.
Project: 52 miles of 18-in. from Parker County to Palo Pinto County, Tex.
Contractor: Company forces.
Completion: March 1961.

LO-VACA GATHERING CO. (see parent company, Coastal States Gas Producing Co.)

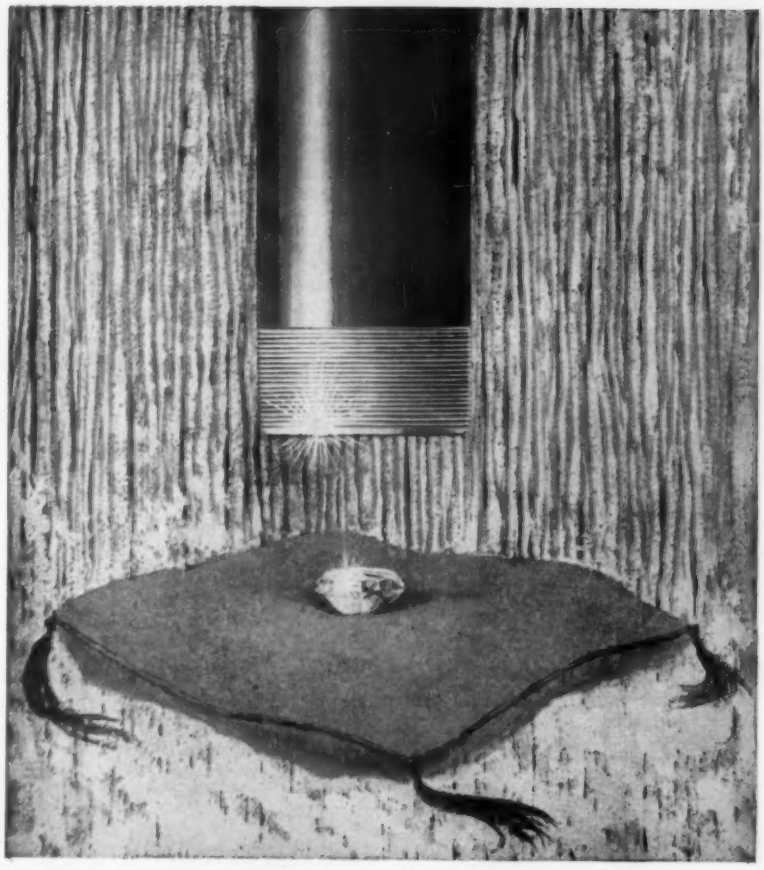
MANUFACTURERS LIGHT & HEAT CO., Union Trust Building, Pittsburgh 19, Pa.
Project: 10½ miles of 24-in. Washington-ton and Beaver counties, Pennsylvania.
Status: Planned.
Completion: September 1961.
Project: 7 miles of 4 to 12-in. in the Victoria storage field, Marshall County, W. Va.
Contractor: Felmont Oil Corp.
Completion: March 1961.

MISSISSIPPI RIVER FUEL CORP., 407 North 8th Street, St. Louis 1, Mo.
Project: 5 miles of 16-in. and 15 miles of 12-in. from Collinsville, Ill., to St. Jacob, Ill.
Status: Pending FPC approval.

MISSISSIPPI RIVER TRANSMISSION CORP. (Mississippi River Fuel Corp.), St. Louis.
Project: 94 miles of 18-in. from Johnsonville, Ill., to the St. Louis area.

MONTANA POWER CO., Box 1338, Butte, Mont.
Project: 16-in. line from Carway, Alta., to Cut Bank, Mont.
Status: Proposed.

NATURAL GAS PIPELINE CO. OF AMERICA, 122 South Michigan Avenue, Chicago.
★ Project: 50 miles of 20-in. laterals and 4.5 miles of 6-in. laterals to connect with existing 26-in. system in Jim Wells County, Texas, plus 33 miles of 10-in. laterals in the Normanna area.
Status: Temporary FPC approval.



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PIPELINE CONSTRUCTION

Project: 347 miles of 8, 30, and 36-in. loop and gathering line at various locations between Texas and Illinois.
Completion: 1961.

PACIFIC GAS & ELECTRIC CO., 245 Market St., San Francisco.
Project: 67 miles of line from Kettleman Hills to Morro Bay, Calif.
Project: 120 miles of 34-in. looping of Topock-Milpitas main line.
Status: Planned. Pending FPC approval.
Completion: 1961.
Project: 291 miles of 36-in. from the California-Oregon border to Antioch, Calif. (Part of a 1,400-mile project to move Alberta gas to San Francisco.)
Contractor: H. C. Price Co., Bartlesville, Okla. (Bechtel Corp. San Francisco, is the engineering manager.)
Status: Under way.
Completion: System will be in use during 1961-62 winter season.

PACIFIC GAS TRANSMISSION CO. (Pacific Gas & Electric Co., San Francisco).
Project: 611 miles of 36-in. from the Canadian border at Eastport, Idaho, to the California border near Klammath Falls, Ore. (Part of a 1,400-mile project to move Alberta gas to San Francisco.)
Contractors: Western Pipe Line, Inc., Austin, Tex., and J. P. Neill & Co., Dallas, have contracts for the 465-mile southern portion. H. C. Price Co., Bartlesville, Okla., has contract for the 146-mile northern portion from Rosalia, Wash., to Eastport, Idaho. (Bechtel Corp., San Francisco, is the engineering manager.)
Status: Under way.
Completion: The system will be in use during the 1961-62 winter season.

PAN AMERICAN GAS CO., Box 591, Tulsa.
Project: 50-mile system from Pan American's terminal at Texas City to Pasadena and La Porte.
Status: Under way.

PANHANDLE EASTERN PIPE LINE CO., 120 Broadway, New York.
★ Project: 298 miles of 30-in. loops, 43 miles of 16 to 26-in. supply laterals, and 80 miles of 6 to 12-in. sales laterals.
Status: Pending FPC approval.

PHILLIPS PETROLEUM CO., Bartlesville, Okla.
★ Project: 16 miles of 2 to 8-in. gathering line in Eddy County, New Mexico.
Status: Planned.
★ Project: 17 miles of 4 to 10-in. gathering line in Midland County, Texas.
Status: Planned.

PIONEER NATURAL GAS CO., Amarillo.
Project: 21 miles of 12-in. from Sudan to Muleshoe, Tex.
Status: Pending FPC approval.
Project: 12 miles of 10-in. from Muleshoe, Tex. northward.
Status: Pending FPC approval.

PUBLIC SERVICE CO. OF NORTH CAROLINA, Gastonia, N. C.
Project: 17½ miles of 14-in. between Stem and Roxboro, N. C.
Status: Under way.

RIO GRANDE VALLEY GAS CO., Box 391, Brownsville, Tex.
Project: 5 miles of 12-in. near Weslaco, Tex.
Completion: February 1961.

SOUTHERN CALIFORNIA GAS CO., and SOUTHERN COUNTIES GAS CO. OF CALIFORNIA, Los Angeles.
Project: 150-mile line across southern California from the Nevada border to the Los Angeles basin. Line would connect with a proposed El Paso Natural Gas Co. line extending to Rock Springs, Wyo.
Status: Pending approval of State Public Utilities Commission of California.

SOUTHERN UNION GAS CO., Fidelity Union Tower, Dallas 1. and **EL PASO NATURAL GAS CO.,** Box 1492, El Paso.
★ Project: 60-mile line from El Paso's main line near Holbrook, Ariz., to paper mill under construction near Snowflake.
Status: Planned.

ST. LAWRENCE GAS CO., Ogdensburg, N. Y.
Project: 75 miles of line from Cornwall, Ont., to Ogdensburg, N. Y.
Status: Approved by FPC.

TENNESSEE GAS PIPELINE CO., a division of Tennessee Gas Transmission Co., Box 2511, Houston 1, Tex.
Project: 15 miles of 12-in. gathering line offshore Louisiana.
Status: Pending FPC approval.
Project: 11½ miles of 20-in. offshore Louisiana.
Status: Pending FPC approval.
Project: 21 miles of 16-in. gathering line from Louisian coast to Block 46 in the Vermillion area.
Status: Pending FPC approval.
Project: 2 miles of 12-in. gathering line from Block 66 to Block 64, East Cameron area, offshore Louisiana.
Status: Pending FPC approval.
Project: 158 miles of 36-in. loop lines at various points between Kinder, La., and Centerville, Tenn.
Status: Approved by FPC.
Project: 50½ miles of 10 to 16-in. gathering lines offshore Louisiana.
Status: Approved by FPC.
Project: 12 miles of 12-in. gathering line from Louisiana coast to Block 17, East Cameron area, offshore Louisiana.
Status: Under way.
Contractors: Popich Marine Construction Co. and Brown & Root, Inc., Houston
Project: 166 miles of 36 and 30-in. loop lines at various points in Ohio and Pennsylvania.
Status: Pending FPC approval.

TENNESSEE GAS TRANSMISSION CO., Box 2511, Houston.
Project: For proposal to carry Texas gas to California via a 1,100-mile 30-in. line through Mexico, see Foreign Natural Gas listing.
Project: 292-mile line from the California-Mexican border to Los Angeles to tie in with above-mentioned line across northern Mexico.
Status: Tennessee Gas's subsidiary, California Gas Transmission Co., and Southern California Edison Co. have filed applications with California Public Utilities Commission. Also pending FPC approval.
Completion: July 1962.
Project: A line from producing fields in Texas to the Mexican-Texas border, which would connect with proposed line through northern Mexico to California.
Status: Tennessee Gas has formed a Texas subsidiary, Tennessee California Gas Transmission Co., to build and operate the Texas segment.

TEXAS EASTERN TRANSMISSION CORP., Box 1189, Houston 1.
Project: 66 miles of 30-in. loops between Vidor, Tex., and Lambertville, N. J.
Status: Temporary FPC approval.

TEXAS GAS TRANSMISSION CORP., Box 577, Owensboro, Ky.
Projects: 146 miles of new line including 6, 26, and 30-in. loops in Kentucky, Tennessee, Mississippi, Louisiana, and Indiana, and 50 miles of 8 and 16-in. to connect five fields in Terrebonne Parish, Louisiana.

TRANSCONTINENTAL GAS PIPE LINE CORP., 3100 Travis St., Houston, Tex.
Project: 7 miles of 16-in. in New Jersey.
Status: Pending FPC approval.
Completion: 1961.
Project: 31 miles of 30-in. in Texas.
Status: Pending FPC approval.
Completion: 1961.
Projects: 36-in. as follows: 33 miles in Louisiana, 22 in Mississippi, 62 in Alabama, 39 in Georgia, 22 in South Caroline.
Status: Pending FPC approval.
Completion: 1961.

TRANSWESTERN PIPELINE CO., 618 First City National Bank Building, Houston 2, Tex.
Project: 240 miles of 4-in., 172 of 6-in. 134 of 8-in., 96 of 10-in., and 8 of 12-in. gathering line in Texas and Oklahoma. (Part of this listed in last month's report.)
Status: Under way.
Contractor: Sheehan Pipe Line Construction Co., Tulsa.
Completion: April 1961.

TRUNKLINE GAS CO., Box 1642, Houston.
Projects: About 155 miles of 30-in. loop in Illinois, Kentucky, Tennessee, Mississippi, and Louisiana, plus 17 miles of 24-in. loop from Lowry, La., to south of Iowa, La.
Contractors: Cape Construction Co., Girardeau, Mo., has 20 miles near Effingham, Ill., and Panama-Williams Corp., Houston, has 40 miles near Grove and Rayville, La.
Project: 52 miles of 20-in. from Bayou Sale to Cow Island, La.
Status: Pending FPC approval.

UNITED GAS PIPE LINE CO., Box 1407, Shreveport 92, La.
★ Project: 217 miles of 30-in. from St. Mary Parish to near Monroe, La.
Status: Pending FPC approval.
Completion: Late 1961.
Project: 59 miles of 36-in. purchase lateral connecting Bastian Bay field, Louisiana.
Status: Pending FPC approval.
Completion: Fall 1961.

WASHINGTON GAS LIGHT CO., 1100 H St., NW, Washington 5, D. C.
Project: 16 miles of 24-in. from near Alexandria, Va., to Prince Georges County, Maryland.
Status: Approved by FPC.

U. S. Miscellaneous Pipelines

LINDE CO., a division of Union Carbide Corp., 270 Park Ave., New York 17.
Project: 8-mile pipeline to deliver oxygen from new oxygen and nitrogen plant on the Houston Ship Channel to Arco Steel and Diamond Alkali.
Completion: 1961.

MONSANTO CHEMICAL CO., 800 North Lindbergh Bldv., St. Louis 66.
★ Project: 25-mile lines to move petrochemicals between proposed plant at Chocolate Bayou and Texas City.
Status: Planned.

SUNOLIN CHEMICAL CO., 1608 Walnut St., Philadelphia 3.
★ Project: ten 8-in. chemical lines from SunOlin's ethylene-oxide plant under construction at Claymont, across the Delaware River to a point north of Penns Grove, N. J.
Status: Planned. To start this spring.
Completion: By late 1961.

TEXAS EASTERN TRANSMISSION CORP., Box 1189, Houston 1.
Project: 350 miles of 24-in. coal-slurry line to move West Virginia coal to electric companies in Pennsylvania, New

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PIPELINE CONSTRUCTION

York, and New Jersey. (Texas Eastern is working jointly with Consolidation Coal Co., Pittsburgh, Pa.)
Status: Proposed.
Completion: Possibly in 1962.

Canadian Crude Oil Pipelines

ACT OILS, LTD., 505 Eighth Avenue Building, Calgary.
Project: 450-mile line from Fort St. John area to Kitimat tidewater area of British Columbia.
Status: Proposed, but not for immediate future.

BITUMINOUS OIL PIPELINE CO. (Royalite Oil Co., Ltd., Royalite Building, Calgary.)
Project: A 250-mile line from Athabasca oil sands to Edmonton.
Status: Proposed.

HUDSON'S BAY OIL & GAS CO., LTD., 320 7th Ave. W, Calgary, Alta.
Project: 41 miles of 4 and 8-in. condensate line from the Waterton-Castle River area and Pincher Creek field in southwestern Alberta to Carway near the international border. The new line would then connect with Continental Pipe Line's Glacier crude system in Montana and Wyoming.
Status: Pending approval. (Hudson's plans new company, Aurora Pipe Line Co., to operate line.)

MATADOR PIPE LINE CORP., Denver.
Project: 175-mile line from Burke, Bottineau, and Renville counties, North Dakota, to Cromer, Man.
Status: Proposed. (See U. S.)

MID-CONTINENT PIPE LINES, LTD., Edmonton, Alta.
Project: 1,500 miles of 30-in. from Edmonton to Chicago. U. S. section to be owned by International Oil Pipeline Corp., New York City.
Status: Pending Canadian Board of Transport Commission approval. W. C. Gilman & Co., New York City, has made preliminary study.

RANGELAND PIPE LINE CO., Calgary.
Project: 111-mile line from Cessford field to Calgary.
Status: Pending approval of Alberta government.

TRANS-PRAIRIE PIPELINES, LTD., 12912 125 Ave., Edmonton, Alta.
Project: Expansion of gathering system in British Columbia will include 40 miles of 4-in. from Taylor to Dawson Creek; 30 miles of 6-in. from Boundary Lake to Taylor; 75 miles of 8-in. from Taylor to Milligan Creek, 11 miles of 4-in. from Milligan Creek to West Beaten; and 4 miles of 8-in. near the Taylor station.
Status: Under way.
Contractor: Banister Construction Co., Ltd., Edmonton.
Completion: By fall of 1961.

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Canadian Products Pipelines

BRITAMOIL PIPE LINE CO., LTD., Box 130, Calgary, Alta.
Project: 126-mile 6-in. line from Pincher Creek to Calgary.
Status: Pending approval of the Alberta Oil and Gas Conservation Board.
Project: 64-mile 8-in. line from Dick Lake to Edmonton, Alta.
Status: Pending approval of the Alberta Oil and Gas Conservation Board.

FOOTHILLS PRODUCTS PIPE LINE LTD., (Pembina Pipe Line Co., Mannix Co., Ltd.), Calgary, Alta.
Project: 1,300 miles of 16-in. from Alberta to Chicago.
Status: Proposed.

HUGHENDEN PIPELINE.
Project: 125 miles from Dick Lake gasoline plant to underground storage in the Hughenden region of easter Alberta.
Status: Pending approval of Alberta Oil and Gas Conservation Board.

PROVINCIAL PRODUCTS PIPELINES, LTD.
Project: 700 miles of 4 to 12-in. line to pick up propane, butane, and condensates from natural-gas plants in Alberta for delivery to refineries and other plants.
Status: Pending approval of Alberta Oil and Gas Conservation Board.

WESTALTA PRODUCTS PIPELINE, LTD., (Pembina Pipe Line, Ltd., Edmonton, Alta).
Project: 885-mile 4 to 16-in. gathering system to take natural-gas liquids from plants in Alberta for delivery to proposed trunkline to Great Lakes area.
Status: Pending approval of Alberta Board of Public Utility Commissioners.

Canadian Natural Gas Pipelines

ALBERTA GAS TRUNK LINE CO., LTD., Calgary.
Project: 226 miles of 36-in. and 125 miles of 30-in., plus laterals in southern Alberta including 58 miles of 22-in. and 64 miles of 16-in. (This is part of a 1,400-mile system to move Alberta gas to San Francisco.)
Contractors: Majestic Contractors, Ltd., Edmonton, has 113 miles of 36-in. from Crowsnest Pass to Priddis, 63 miles of 30-in. from Rocky Mountain House to Cynthia, and 38 miles of 22-in. lateral to the Rimbey region. Mannix Co., Ltd., Calgary, has 113 miles of 36-in. from

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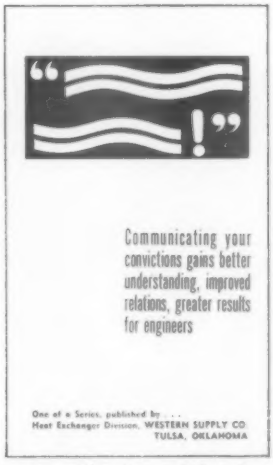
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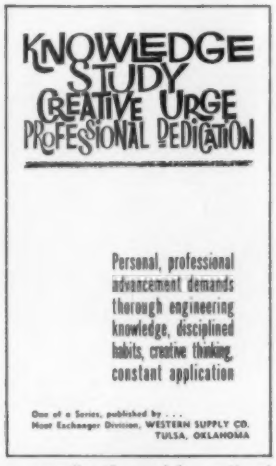
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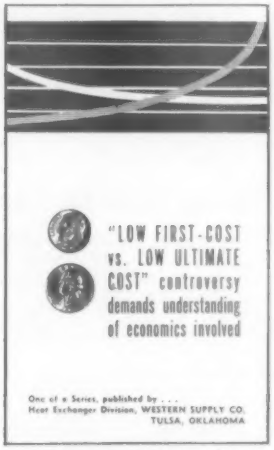
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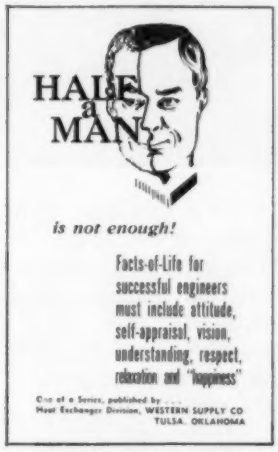
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PIPELINE CONSTRUCTION

Priddis to Rocky Mountain House. Dutton-Williams Brothers, Ltd., Calgary, has 62 miles of 30-in. from Cynthia to near Whitecourt, Alta., as well as a 20-mile, 22-in. lateral to the Whitecourt area. Piggott Construction, Ltd., Edmonton, has 64 miles of 16-in. lateral from Crowsnest Pass to Carway, Alta., on the U. S. border.

Completion: To be in use during the 1961-62 winter season.

Projects: The following laterals will be built in 1961 to tie in with the above mentioned 1,400-mile project from Alberta to San Francisco: 15 miles of 12-in. to Buck Lake, 23 miles of 22-in. to East Calgary, 15 miles of 16-in. to Carstairs, 4 miles of 8-in. to Sarcee, and 10 miles of 10-in. to Wildcat Hills. Other laterals to be built in the future will connect Kaybob, Berland River, Lovett River, and Stolberg.

ALBERTA NATURAL GAS CO., LTD. (Pacific Gas & Electric Co., San Francisco, and Westcoast Transmission, Calgary.)

Project: 108 miles of 36-in. from Crowsnest Pass across southeastern British Columbia to the U. S. border near Eastport, Idaho. (This is part of a 1,400-mile project to move gas from Alberta to San Francisco.)

Contractor: Price-Poole of Canada, Ltd. (Canadian Bechtel, Inc., Toronto, is engineering manager.)

Completion: The system will be in use during the 1961-62 winter season.

CANADIAN INDUSTRIAL GAS, LTD. (formerly Ajax Petroleums, Ltd.), Derrick Building, Calgary, Alta.

Project: 28 miles of 10-in. and 4 miles of 8-in. from Morinville to Westlock Viking Sand field.

Status: Planned.

Completion: By September 1961.

CARTIER GAS CORP. (St. Maurice Gas, Inc., and Consumers Gas Co., 19 Toronto St., Toronto).

Project: Transmission and distribution in eastern townships and through to Quebec City in Quebec Province.

Status: Proposed.

GAS TRUNK LINE OF BRITISH COLUMBIA, LTD., Pacific Bldg., Calgary.

Project: 245-mile, 30-in. extension of Westcoast Transmission system from Taylor, B. C., to Fort Nelson.

Status: Under way.

Completion: December 1961.

MAGNA PIPELINE CO., LTD., Nanaimo, Vancouver Island, B. C.

Project: 53 miles of parallel 7-in. reinforced plastic pipe to serve Vancouver Island, B. C.

Status: Approved by British Columbia Public Utilities Commission. Tentative timetable calls for work to start by spring 1961.

NORTHERN ALBERTA PIPE LINES, LTD., Edmonton, Alta.

Project: 110-mile trunk line, plus gathering system, from Lac La Biche, in McMurray vicinity, to Edmonton.

Status: Pending provincial approval.

QUEBEC GAS TRANSMISSION LINES, INC., 1610 Sherbrooke St. W., Montreal.

Project: 300-mile line from Montreal to Quebec City.

Status: Seeking pipeline franchise from Quebec provincial government.

SARATOGA PROCESSING CO., LTD., 406 Petroleum Building. Calgary.

★ Project: 16-in. line from Savanna Creek field, Alberta, to a planned processing plant near Coleman.

Status: Pending approval.

VAN TOR OIL & EXPLORATION CO., Vancouver, B. C.

Project: Line from British Columbia mainland to Vancouver Island.

WESTCOAST TRANSMISSION CO. LTD., Calgary.

Project: 688-mile, 30-in. loop of British Columbia-Washington line.

Status: Proposed.

Project: (See Alberta Natural Gas Co., Ltd., for joint project).

Foreign Crude Oil Pipelines

ABU DHABIE MARINE AREAS, LTD. (partly owned by British Petroleum Co., Britannic House, Finsbury Circus, London E.C. 2).

Project: 20 miles of 18-in. from offshore Persian Gulf pool to Das Island.

Completion: 1962.

ALGERIAN LINES.

Project: 75-mile 10-in. line to link the new oil field, El Gassi-El Agreb, with the existing Hassi Messaoud-Bougie line. SNPA is field operator.

Status: Planned.

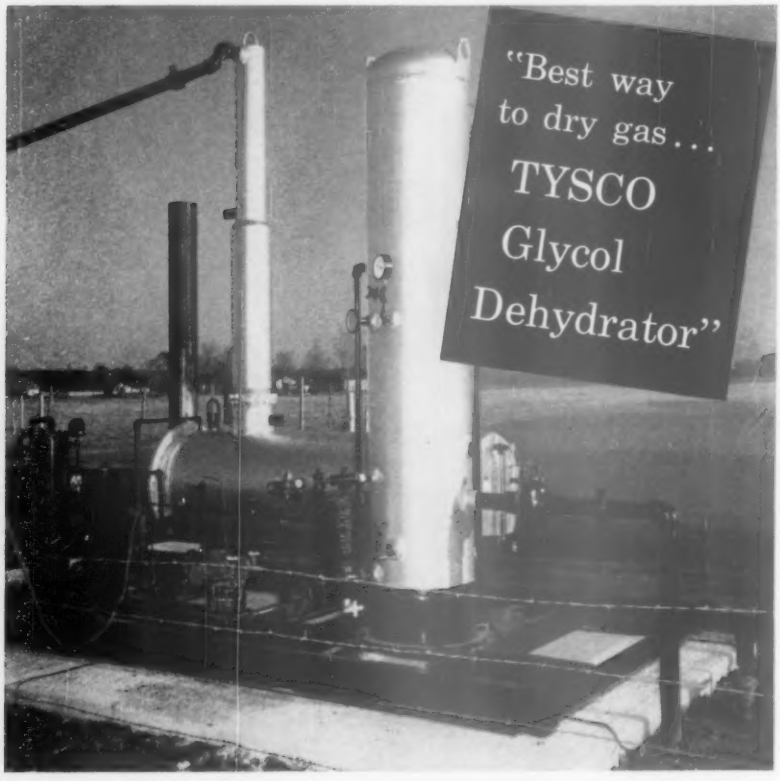
★ Project: 340-mile line from Ohanet field to the Hassi Messaoud system.

Status: Approved by French Council of Ministers.

BARNABO GROUP (Italian interests).

Project: A line from Venice, Italy, to Innsbruck, Austria, which could then be extended to Munich, Germany.

COUNCIL FOR MUTUAL ECONOMIC AID (Comecon).



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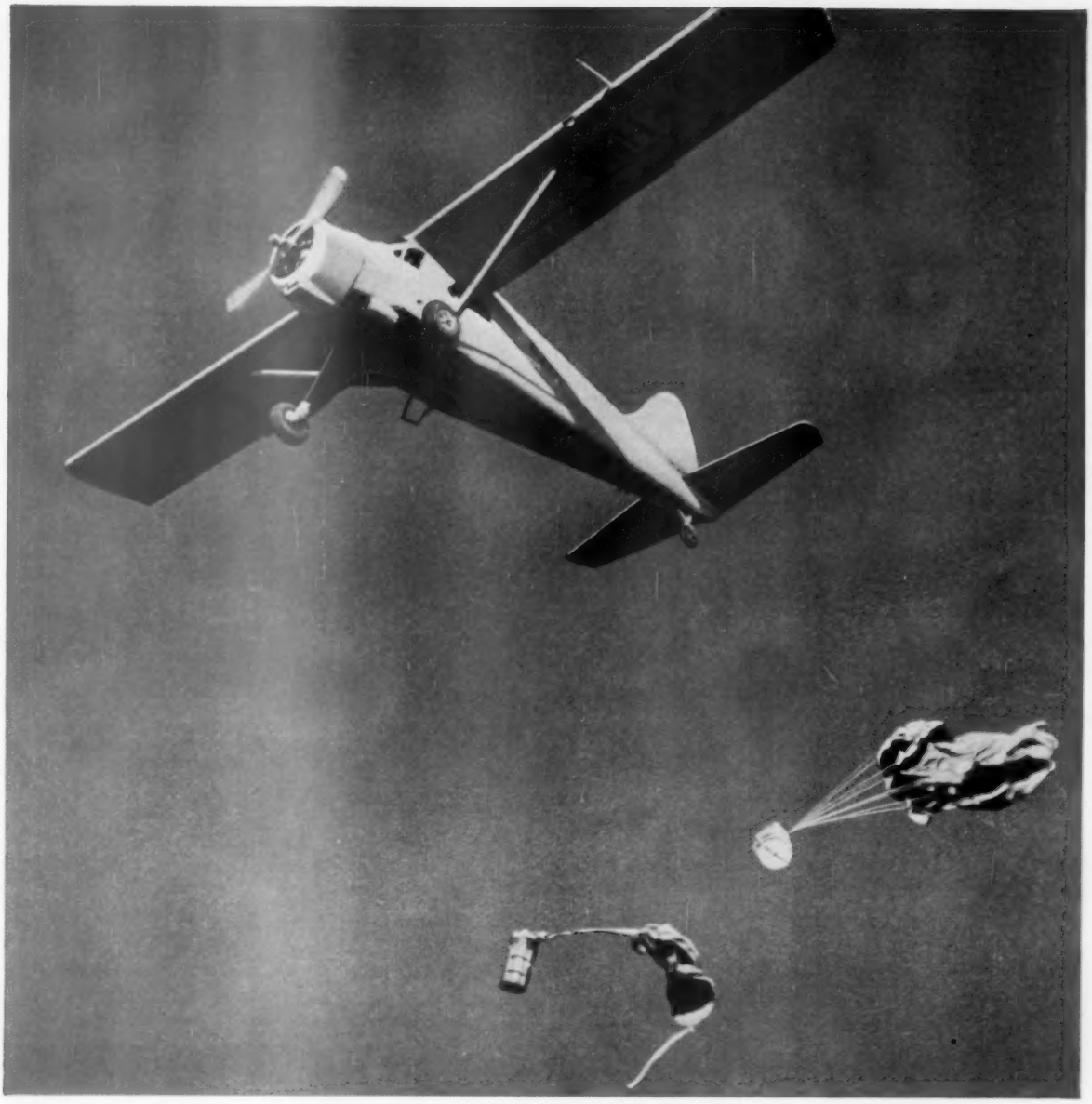

Airlift Australia

AUSTRALIA'S Snowy Mountains Scheme has presented some unusual challenges to BP as sole supplier of petroleum products. Some of these challenges have been met in unusual ways, such as fuel drops from aircraft.

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PIPE LINE SURVEYS

PIPELINE CONSTRUCTION

Project: 2,800-mile system from the Volga-Ural oil fields in Russia to East Europe satellite countries.
Status: Construction under way in Poland, Hungary, and Czechoslovakia. Construction in Russia to start soon.

ENI (Italian state oil agency) and ITALO-SWISS FINANCE CO.
Project: A 700-mile system from Genoa to Aigle, Switzerland, thence northeast to the German border, where it would split with one branch going to Munich and another branch to the Karlsruhe area. Feeder lines would go to Turin, Milan, and Cremona, Italy.
Status: The trunk line from Genoa to Aigle approved by the Italian Government.

ENI (Italian state oil agency).
Project: Line from Trieste to Ingolstadt, Bavaria, with possible branch from Carnic in western Austria, to Vienna.
Status: Being discussed.

ESSO STANDARD (LIBYA), INC.
Project: 100 miles of 30-in. from Zelten field to Gulf of Sirte.
Status: Under way.
Contractor: Arabian Bechtel Corp.
Completion: Mid-1961.

GERMAN LINE planned by eight German refining and marketing companies (British Petroleum, Esso, Deutsche Erdoel, Shell, Gelsenberg-Benzin, Mobil, Schloven-Chemie, and Wintershall).
Project: 155-mile, 24-in. line to Bavaria from Karlsruhe.
Status: Planned.

IRANIAN OIL EXPLORATION & PRODUCING CO.
Project: 30 miles of 20-in. and 22 miles of 16-in. looping of Agha Jari to Bander Mashur line.
Status: Planned.

IRAQ PETROLEUM CO., LTD., 214 Oxford St., London W 1.
Project: Looping of Kirkuk-Mediterranean system is under way on a 66-mile stretch between K-1 and K-2 stations and on an 81-mile stretch between K-3 towards the Syrian border. In Syria, a 28-mile section of 30-in. is under way

MENE GRANDE OIL CO., Apartado 709, Caracas.
Project: 16-in. line at Block 11, Maracaibo.
Completion: December 1961.

OASIS OIL CO. OF LIBYA, 539 South Main St., Findlay, Ohio. (Other participants are Esso Sirte and Libyan American Oil Co.)
Project: 86 miles of 30-in. from the Dahra area of Libya to El Sider on the Mediterranean Coast, and 36 miles of 20-in. feeder line from the Mabruk area to the 30-in. line.
Status: Pending approval of the Libyan Petroleum Commission and the provincial government of Tripolitania.

OIL INDIA, LTD. (Burmah Oil Co. and Assam Oil Co., two-thirds, and India Government, one-third).
Project: 720 miles of line in northeast India. This will include 250 miles of 16-in. from Nahorkatiya to Noonmati and 470 miles of 14-in. from Noonmati to Barauni.
Contractors: Mannesmann, a German firm, and SAIPEM, a member of the ENI group.
Status: Under way.
Completion: The 16-in. system is scheduled for completion late 1961.

PETROLEO BRASILEIRO S.A. (Brazil).
Project: 250-mile line from Rio de Janeiro to Belo Horizonte refinery site.
Status: Under consideration.,
Project: 35 miles of 8 to 12-in. pipe from Buracica to Candeia.
Contractor: Techint, Inc., Milan, Italy.
Project: 80 miles of 24-in. to tie in to proposed Caxias refinery near Rio de Janeiro.
Status: Planned.

PHILLIPS PETROLEUM CO., Bartlesville, Okla.
★ Project: 14-in. line in Block 17, Lake Maracaibo, Venezuela.
Status: Planned.
Contractor: Chicago Bridge & Iron Co.

ROYAL DUTCH-SHELL.
Project: 12-mile line from Gore Bay, Australia, to Royal Dutch-Shell's Clyde refinery.
Status: Planned.
Project: 161 miles 20-in. line from Tandzung field to Balikpapan refinery, Borneo.
Status: Planned.
Contractor: Williams Brothers Overseas, Ltd., Tulsa, and John Brown, Ltd., London.
Completion: January 1, 1962.

SOUTH EUROPEAN PIPELINE CO (Jersey Standard, Caltex, Shell, British Petroleum, and 12 other firms.)
Project: 419 mile 30-in. line from Lavera, near Marseille, to Strasbourg, with 40 mile extension to Karlsruhe, Germany This may be extended into lower Batavia with a 155-mile, 22-in. segment.
Status: Under way.
Completion: 1963.

SYRIAN PIPELINE, Damascus.
Project: 500-mile line from Karshuk field, Syria, to Mediterranean.
Status: Proposed.

UNION OF SOVIET SOCIALIST REPUBLICS.
Project: 2,315 miles of 28-in. Trans-Siberian crude-products line from Ufa and Tuimazy fields in Bashkiria to Irkutsk.
Status: Under way.
(See Council for Mutual Economic Aid for information on new East Europe line.)

YACIMIENTOS PETROLIFEROS FISCALES (Argentina), Buenos Aires.
Project: 390 miles of 14-in. from fields in Neuquen Province, Argentina, to Bahia Blanca.
Status: Under way.
Project: 625 miles of 12-in. from Mendoza to San Lorenzo.
Status: Planned.

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PIPELINE CONSTRUCTION

Foreign Products Pipelines

ARABIAN AMERICAN OIL CO., Dhahran, Saudi Arabia, and 505 Park Avenue, New York.
Project: 37 miles of 8-in. LPG line from Abqaik to 'Ain Dar.
Contractor: Aramco-Bechtel.
Completion: 1961.

INDIA GOVERNMENT.
Projects: 600-mile line across northern India from Barauni to Delhi via Kanpur. Lucknow, and Allahabad; 300-mile combination crude and products line from Bombay to Bhusaval; 120-mile products line from Bombay to Poona to be extended 300 miles, later, to Hyderabad; and a 350-mile products line from Cochin to Madras via Bangalore.
Status: Proposed. Recommendation has been made to start work on three of the systems immediately, with completion in 5 years. The fourth system would be started in 1963. Which might be built first was not disclosed.

NATIONAL IRANIAN OIL CO., Teheran.
Project: 520 miles of 8-in. from Rey to Meshed, Iran.
Status: Under way.
Contractor: Williams Brothers, Tulsa.

NORTH ATLANTIC TREATY ORGANIZATION (Bid details from Bureau of Foreign Commerce, U. S. Department of Commerce, Washington.)
Project: 57 miles of 8-in. in Germany to Land Baden-Wuerttemberg air field.
Project: 93 miles of 6-in. in Turkey.

PETROLEOS MEXICANOS, Avenida Juarez 92-94, Mexico City.
Project: 500-mile line from Minatitlan to Mexico City.
Status: Planned, with construction starting in 1961.
Completion: 12 to 18 months after construction starts.
Project: 270 miles of 8-in. from Torreon to Chihuahua.
Status: Under way.
Completion: September 1961.

PIPELINES OF PUERTO RICO, San Juan.
Project: 95 miles 8-in. from Penuelas to Catano.
Status: Approved by Puerto Rican Public Service Commission.

SYRIAN PIPELINE.
Project: About 310 miles from Homs to tank farms in the Damascus, Aleppo, and Latakia areas.

UNION OF SOVIET SOCIALIST REPUBLICS.
Project: 2,315 miles of 29-in. Trans-Siberian crude-products line from Ufa and Tuimazy fields in Bashkiria to Irkutsk.
Status: Under way.
Project: 700 miles from Novo-Kuibyshev refinery to Bryansk.
Status: Under way.

YACIMIENTOS PETROLIFEROS FISCALES (Argentina), Buenos Aires.
Project: 652 miles of 10-in. from Lujan de Cuyo to Buenos Aires.
Status: Planned.

Foreign Natural Gas Pipelines

BASRAH PETROLEUM CO., LTD., 214 Oxford St., Oxford Circus, London W. 1, England.
Projects: 65 miles of 12 to 16-in. line from Zubair to Fao, Iraq.
Contractor: Mothercat Co., Ltd., Beirut, Lebanon.
Completion: April 1961 for line to Fao.

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PIPELINE CONSTRUCTION

GASES NATURALES DE COLOMBIA, S.A. (Owned 50% by Colombian Petroleum Co., which is affiliated with Mobil International and Texaco, and 50% by local interest.)
Project: 140 miles of 10-in. from Cicuco field to the Caribbean port of Barranquilla.
Completion: Late 1961.

INDIA.
Project: India plans to start formal talks with Pakistan soon concerning possibility of importing natural gas from Sui field into India.
Status: Preliminary studies indicate a pipeline to Bombay might be commercially sound.

ISRAEL GOVERNMENT and private interests.
Project: 17-mile, 6-in. line from Zohar field to the Dead Sea.
Contractor: Messrss. Sol el Boneh, Ltd., Haifa.
Completion: February 1961.
Project: 75 miles of 16-in. to power a plant at Ashdod Yam on the Mediterranean Coast.
Status: Planned.

NIOGAS.
★ Project: 82 miles of 8 and 10-in. to connect Traismauer and Amstetten in Austria.
Contractor: Williams Brothers, Tulsa.

PAKISTAN INDUSTRIAL DEVELOPMENT CORP.
Project: 1,000-mile system to carry gas from Sui field northward from Multan to Lyallpur, Lahore, Daudkhel, Islamabad, Rawalpindi, and Wah. This would require a loop to an existing 310-mile 16-in. line from the Pakistan petroleum field to Multan.
Status: Under consideration. Technical survey has been ordered.

PAKISTAN PETROLEUM CO.
Project: 145 miles of 8-in. from Sylhet field to Daccq, East Pakistan.
Status: Proposed.

PETROLEOS MEXICANOS, Avenida Juarez 92-94, Mexico City.
Project: 485 miles of 24-in. from Cuidad Pemex to Mexico City.
Contractor: Condusa.
Status: Under way.
Completion: March 1961.
Project: 165 miles of 14-in. from Mexico City to Salamanca.
Status: Under way.
Contractor: Inde-Condusa.
Completion: March 1961.
Project: 270 miles of 12-in. from Torreon to Chihuahua.
Status: Under way.
Completion: September 1961.
Project: For proposed Texas to California line through Mexico, see Tennessee Gas listing below.

QATAR GOVERNMENT.
Project: 65 miles of 10-in. from Dukhan to Doha.
Contractor: Mothercat Co., Ltd., Beirut, Lebanon.
Completion: March 1961.

SOC. SICILIANI METANDOTTI (SOSIM). Partners include Edison Power, Italcementi, Fiat Motor, Sicilian SGES Power, Bombrini Parodi Delfino Chemical, and Montecatini.
Project: 560 miles from Hassi R'Mel gas field, Algeria, to Cape Bon, Tunisia, 77 miles across the Sicilian Channel, into northern Italy and beyond.
Status: Engineering studies under way.

SOTHRA.
Project: A 315-mile system from Hassi R'Mel gas field in Algeria to the Mediterranean Coast, including 262 miles of 24-in. trunk from Hassi R'Mel to Relizane and 20-in. from Relizane to Arzew, plus branches to Oran and Algiers.
Status: Under way.
Contractors: Groupement Entrepose-Ste. Parisienne pour l'Industrie Electrique (GREP) has contract for 200 miles from Hassi R'Mel to Tiaret. Socoman has contract for 115 miles from Tiaret to Arzew.
Completion: Spring 1961.

STANDARD-VACUUM OIL CO., New York.
Project: 60 miles of 8-in. from Radja field to Palembang, Sumatra, to supply fertilizer plant planned by the government.
Status: Planned.

TEIKOKU OIL CO. and **TOKYO GAS CO.**
Project: These two companies are negotiating a proposed 200-mile, 12-in. system to move gas from Kubiki gas field in Japan.
Status: Proposed.

TENNESSEE GAS TRANSMISSION CO., Box 2511, Houston.
Project 1,100-mile, 30-in. line from Reynosa, near the southern tip of Texas, across Mexico to San Luis Rio Colorado, near the California border.
Status: Agreement signed by Petroleos Mexicanos and Tennessee Gas Transmission. Pemex would own the Mexican portion of the system. Pending FPC approval.

UNION OF SOVIET SOCIALIST REPUBLICS.
Project: New line from gas fields in western Ukraine to the Polish border.
Status: USSR has signed agreement with Poland.
Project: 250-mile line from Ust-Vilyuisk field to the Siberian cities of Yakutsk and Pokrovsk, plus feeder lines to supply villages in the Lena River Valley.
Status: Planned.
Completion: Date not set yet.
Project: Two parallel, 40-in. lines, each over 1,300 miles long, from Gazli, near Bukhara, northward to Sverdlovsk and Chelyabinsk.
Status: Planned.
Project: From Tashkent to Chimkent, Dzhambul, Frunze and Alma-Ata near Chinese border.
Completion: By 1965.
Project: Line from Berezovo field southward to Sverdlovsk.
Status: Proposed.
Project: Line from Minsk northward to Baltic Sea area.
Completion: To Vilnius, Lithuania, in 1961; to Riga, Latvia, in 1962.
Project: Line from Minsk northeast to Leningrad.
Status: Proposed.
Project: 800-mile, 40-in. line from Krasnodar fields north of Caucasus Mountains to Serpukhov, south of Moscow, via Rostov and Lugansk.
Status: Under way.
Project: 310 miles of 32-in. line ringing Moscow at radius of about 50 miles.
Status: Under way.
Completion: 1962.

YACIMIENTOS PETROLIFEROS FISCALES (Argentina), Buenos Aires.
Project: 1,050-mile line from Comodoro Rivadavia to Buenos Aires with a spur to Plaza Huincul field in Neuquen province. Line will be 26 in. to the connecting point for the Plaza Huincul link and 30 in. from the connection to Buenos Aires.
Status: Proposed.

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▶▶▶ New Equipment Section

This week's SHOWCASE features . . .

Single-engine utility plane

. . . recently announced, called the Model 185 Skywagon, is designed for packing heavy pay loads and is certificated for standard gear, ski, and float operations, the maker says.

The plane carries six adults and 270 lb. of extra weight with full fuel at speeds up to 172 m.p.h., the maker announces. A 260-hp. engine with fuel injection powers the craft.

Specifications disclosed include: gross weight, 3,200 lb.; empty weight, 1,520 lb.; and maximum speed, 176 m.p.h. Source: **Cessna Aircraft Co., Wichita, Kan., U.S.A.**

Power barrow for tractor

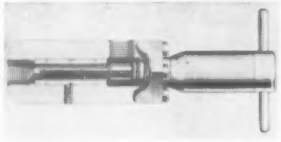
. . . makes a convenient means to move rocks, debris, and other bulky items from industrial-plant lawns and other areas. The barrow attaches to the front of the maker's tractor with four bolts.

Capacity of the unit is 5 cu. ft. of material or about 800 lb. Dumping is easy. Just raise the handle. Source: **Gravely Tractors, Inc., Box 651, Dunbar, W. Va., U.S.A.**

New valve

. . . for lease manifolds now available is a three-position, three-way type for flow diversion. The maker says the Type 1620A valve permits a simplified and less-expensive manifolding system for use where flowing wells are piped to a central separating station, and it is desired to test production of any given well by diverting flow from the production separator to a test separator.

The cage construction in the upper valve port is designed to permit lifting the entire valve-plug assembly out of the valve body while it is in the line. A position indicator shows the valve-plug position at all times. The valve comes in a 2-in. size with screwed connections. Source: **Fisher Governor Co., P. O. Box 307, Marshalltown, Iowa, U.S.A.**



New fluid-control valve

. . . was developed for the control of fluid to hydraulically actuated pumps, including deep-well free pumps. The maker says a replaceable stem assembly can be installed for accurate gas control.

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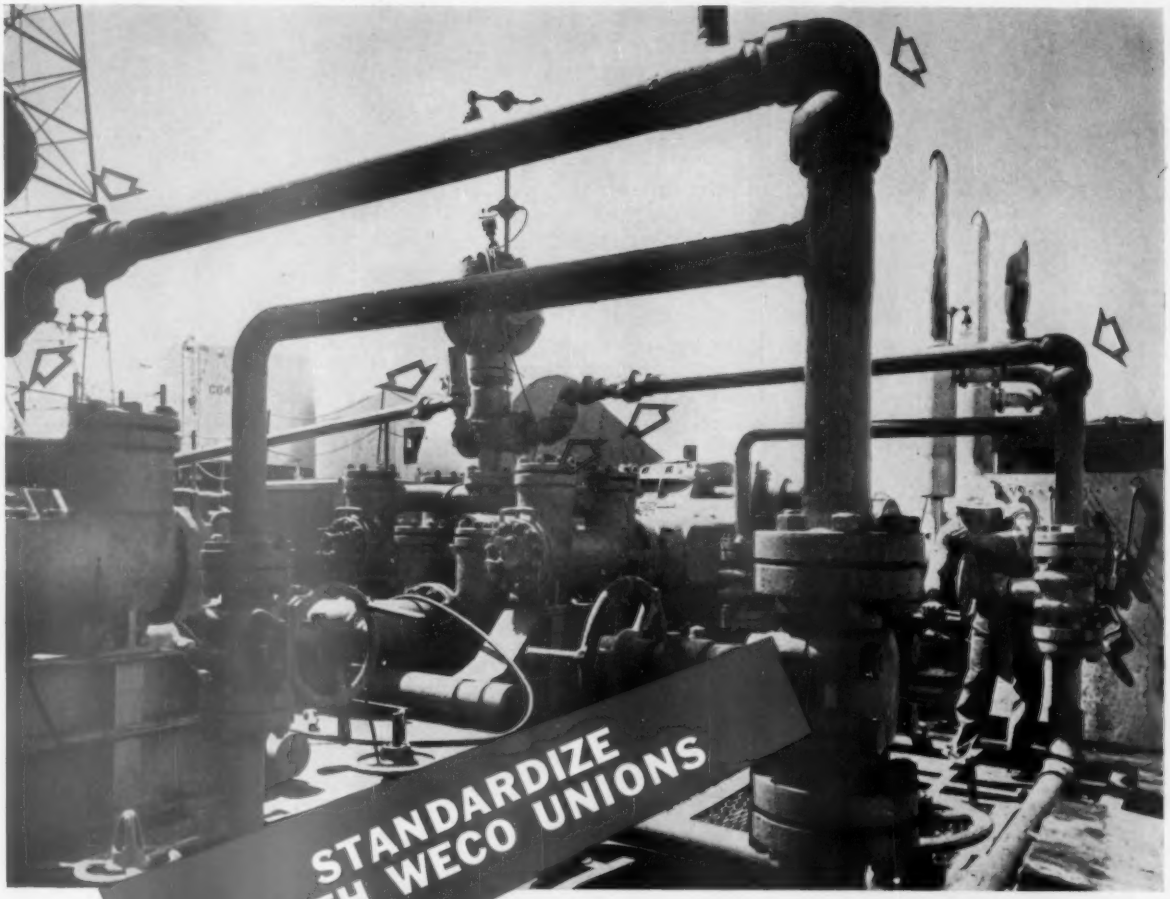

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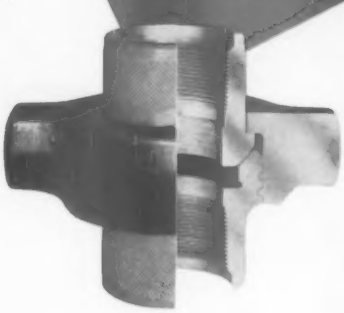

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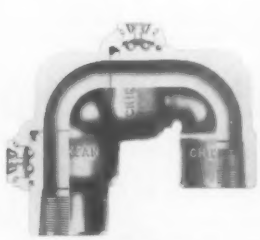

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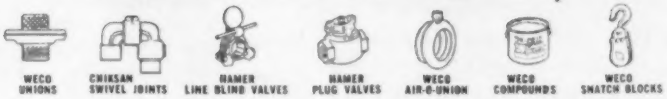

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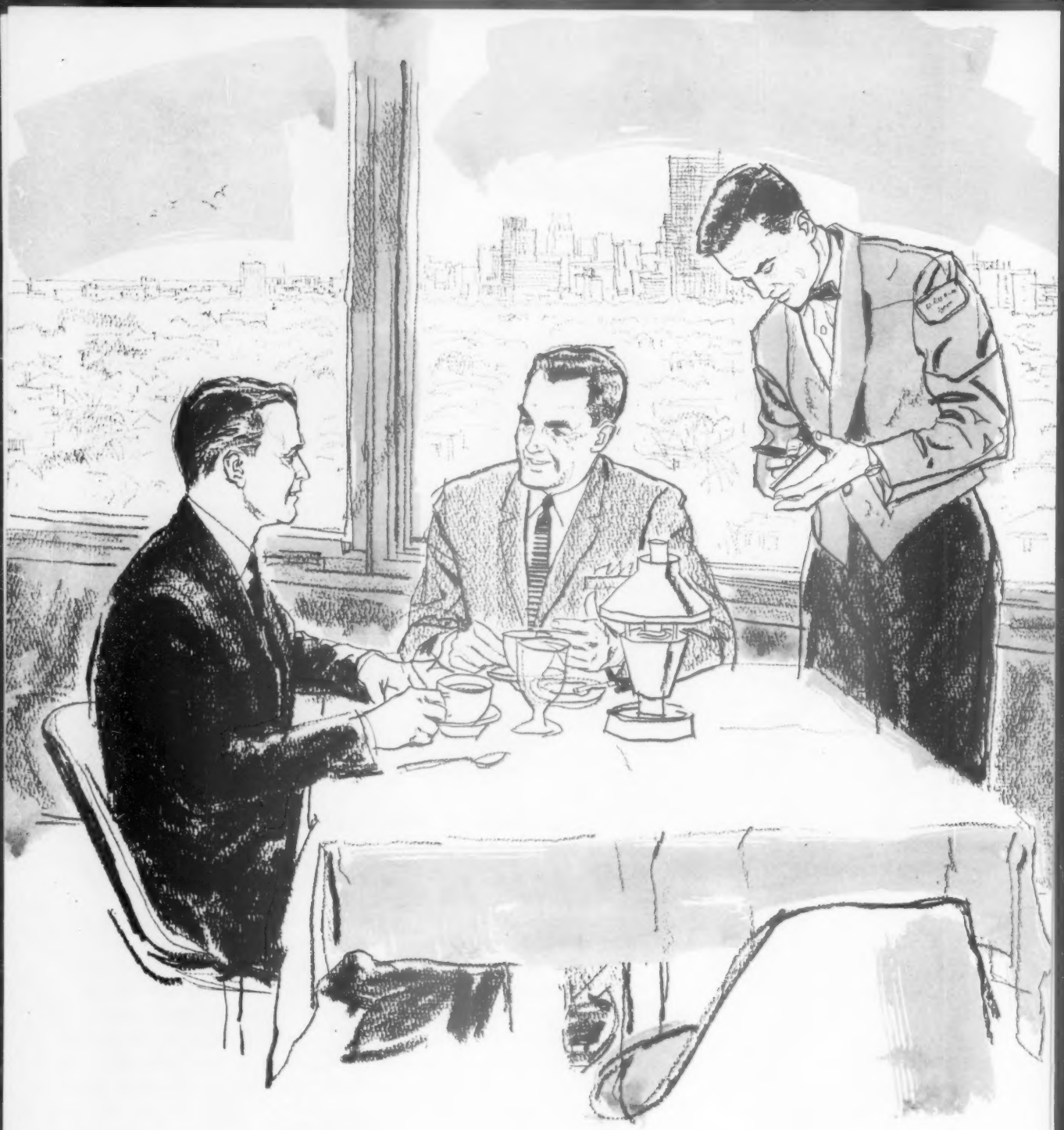

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May we mail you our new brochure, "Business Success Begins at Bank of the Southwest"? It tells how our bank can help your company grow. Address Harold Vance, Vice Pres. and Manager, Oil and Gas Department.

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! MARTIN PLUNGER BODIES, precision grooved, drilled and threaded (no underneath fluid passage), usually last for years. Tube or barrel costs are often cut in half.

! The replaceable SYNTHETIC RUBBER GUIDES in MARTIN CAGES last longer than any metal, and the cushioning of the ball increases your ball & seat life. Results are often truly amazing. (Patent No. 2,591,174)

Write for our new catalog or see it in the Composite (24th Edition). All products sold thru supply companies.

JOHN N. MARTIN
Manufacturer
9 W. BRADY STREET • TULSA, OKLAHOMA

SHOWCASE . . .

New Equipment

ting, ample clearance is reportedly maintained for passage of foreign particles.

Three sizes of interchangeable valve stems with different orifice areas are available to meet various flow-control conditions. At a pressure differential of 1,350 psi., the three stems provide capacity ranges from 10-to-60 to 60-to-1,800 bbl. per day. Working pressure rating is 5,000 psi. Source: **Willis Oil Tool Co., 2451 Palm Dr., Long Beach 7, Calif., U.S.A.**

•

Vertical pump

. . . services easily according to the maker of the Vertiplex pump now on the market. The pump features a spacer type of coupling between the motor shaft and the pump shaft. With this coupling out, a clearance exists between the shafts that lets you raise the rotating element and take it out.

After the coupling is taken out in separate halves and the back plate bolts removed, the pumping element (including the packing gland or mechanical seal) is easily lifted, tilted to one side, and removed, the maker says. Full access is then provided for complete servicing.

The pump comes either with a bottom suction or a direct inline design. Pumps are available in sizes from a 2-in. discharge, 2-in. suction, and 7-in. impeller diameter up to a 4-in. discharge, 6-in. suction, and a 14-in. impeller diameter. According to the maker, these sizes give, at a motor speed of 1,750 r.p.m.,

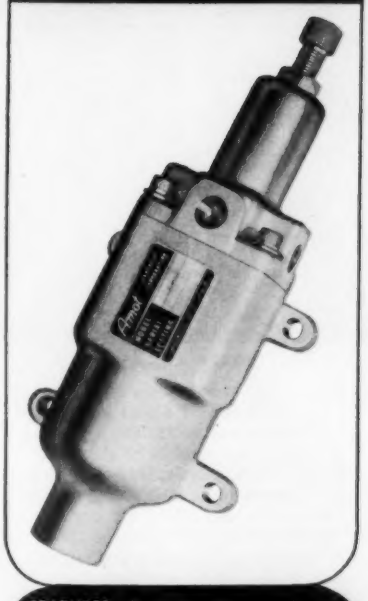
NOW!

DETECT AND STOP EXCESSIVE VIBRATION WITH

Amot MODEL 2900 VIBRATION VALVE

Amot Model 2900 Vibration Valve detects and trips on excessive vibration of reciprocating or rotating machinery, such as engines, compressors, motors, fans, pumps.

It is offered as an accessory to Amot Series 1476 Safety and Automatic Controls.



FEATURES: Duty: For Pneumatic or Hydraulic Control Systems to 80 psi.
Operation: Three-way, snap acting, non-overlap valve action.
Range: Adjustable to amplitudes between .004" and .050" at 250 cpm and between .003" and .023" at 700 cpm or higher.
Reset: Built-in piston to reset control with 45-80 psi air; also provides means for time delay on start-up.

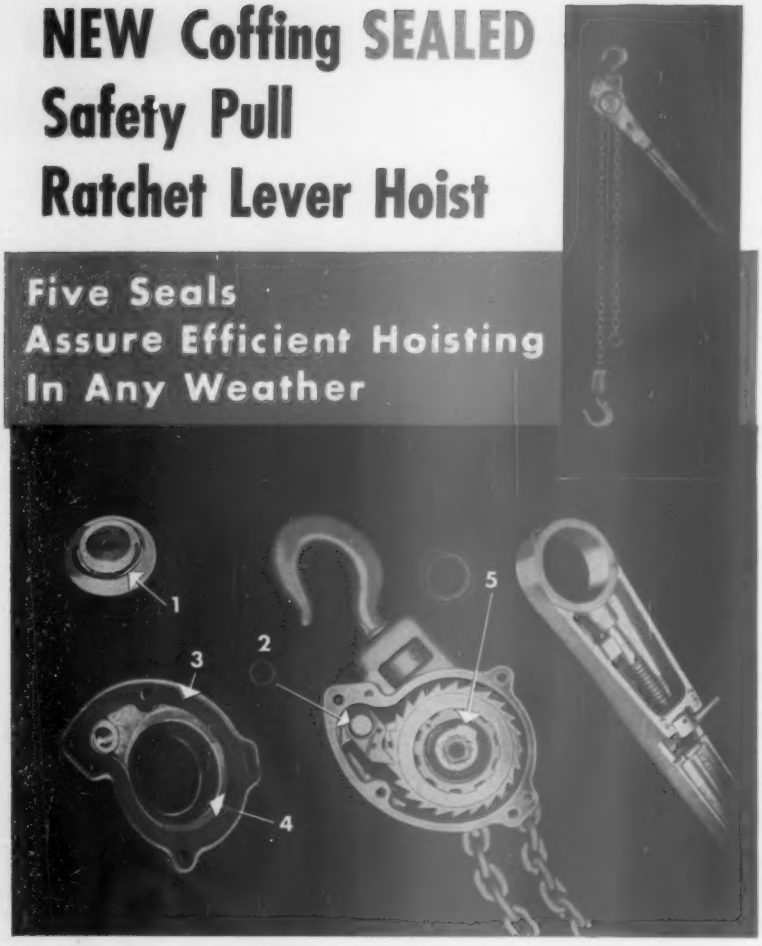
Write for Bulletin 493

Amot controls
CORPORATION
THERMOSTATS CONTROLS SWITCHES VALVES SAFETY CONTROLS

411 A FIRST ST. • RICHMOND, CALIF., U.S.A.

NEW Coffing SEALED Safety Pull Ratchet Lever Hoist

Five Seals Assure Efficient Hoisting In Any Weather



Here is a new hoist designed for safe, efficient hoisting in any weather. Loads will not slip because the brake mechanism of the Safety Pull Hoist is permanently sealed in five places against moisture, oils, chemicals and dirt—all common causes of hoist slippage.

The spring-loaded Neoprene seals assure that brake performance will remain constant under all exposure conditions. Another advantage of the sealed brake is that it will not freeze or lock—is always free to lower even after accidental overload.

Safety features include the exclusive Safety Handle which bends to indicate overload. The free chain control is protected so that it will not accidentally trip.

The Safety Pull Hoist is easy to operate. The handle pull to lift rated load requires minimum effort. Load spotting is precise to within a fraction of an inch. Up and down controls are away from operator's hand so he can use shorter leverage for greater speed with light loads. Ball bearing swivel load hook and plated chain are additional features.

Five models, ¾, 1½, 3, 4½ and 6-ton capacities are available. For additional information see your favorite supply store or write for Bulletin ADH-78B.

COFFING HOISTS

DUFF-NORTON COMPANY

Four Gateway Center · Pittsburgh 22, Pa.

COFFING HOISTS
Ratchet Lever • Air
Hand Chain • Electric

DUFF-NORTON

DUFF-NORTON JACKS
Ratchet • Screw
Hydraulic • Worm Gear

a range of capacity from 120 g.p.m. at 40 ft. to 1,400 g.p.m. at 170 ft. Maximum temperature in present designs is 450° F. Source: **Sempco Corp., P. O. Box 2291, Salt Lake City 10, Utah, U.S.A.**

•

Mobil seismic drill rig

. . . for seismic and radioactivity surveys offers a fast way to complete shot holes. According to the maker, the Seismic-Air 400 rig, in initial trials, completed a 20-ft. deep shot hole in 4 minutes. During this test, 1½-in. round drill rods and a 2-in. bit were used.

The drilling rig is self-contained. Components include a rotary compressor, air hoist for lowering the feed mast and hoisting drill rods, bit grinder, hose, and a 4-in. bore percussion drill. All components are mounted on a truck. Source: **Joy-Sullivan, Ltd., Air Power Div., Cappielow Factory, Greenock, Scotland.**

•

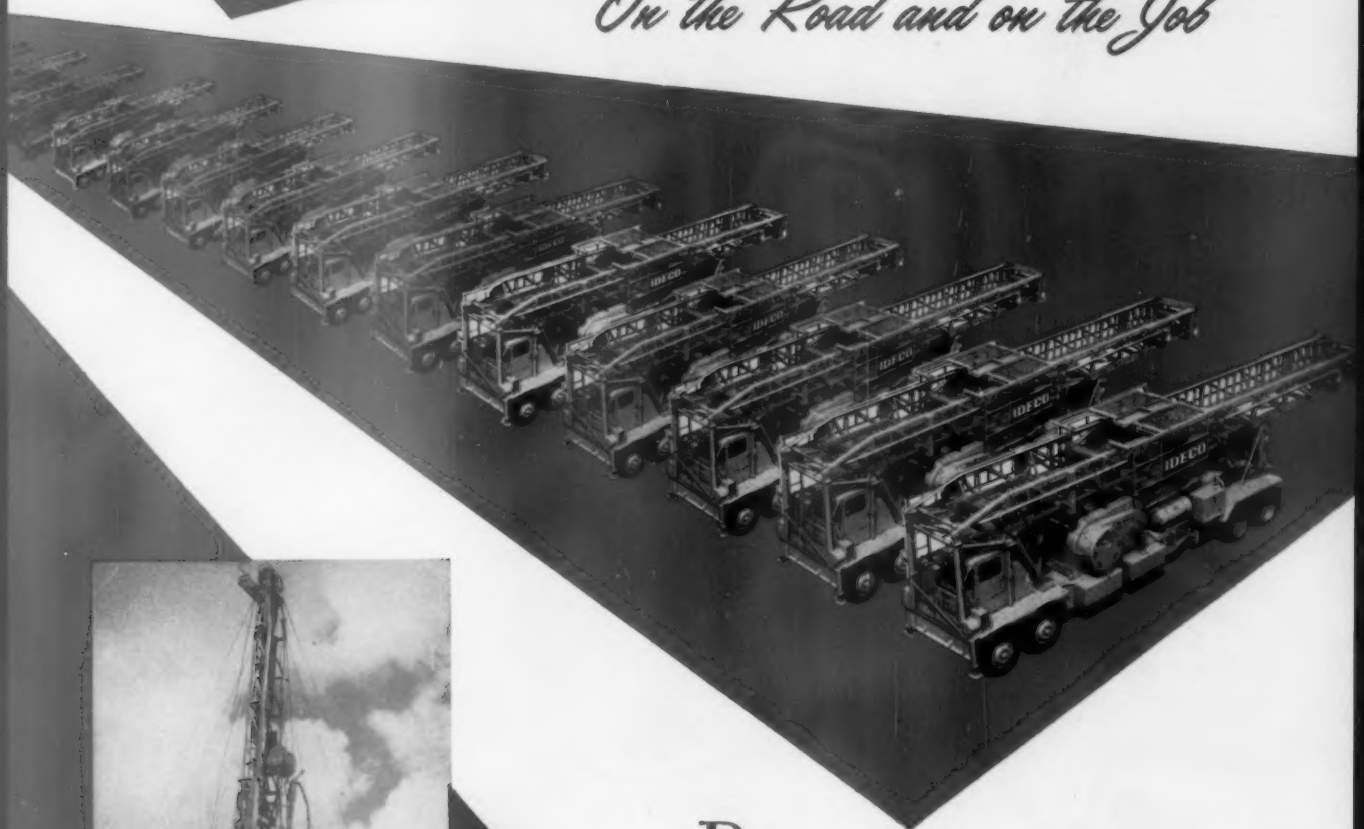
Packaged monitoring system

. . . being offered, called the Burd-Watcher II, is designed to program, monitor, and control reactions and distillations of any size. The circuitry can be varied to fit individual programs. Circuits may be turned on, off, on and off, etc., within preset limits of time, temperature, volume, pressure, motion, position, or combinations of these variables.

IDECO Drive-In Ramblers

BREAK THROUGH THE DOWNTIME BARRIER!

On the Road and on the Job



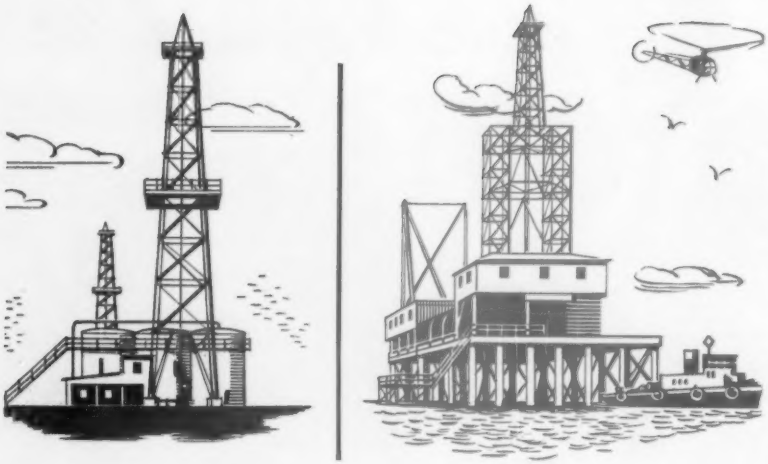
Ideco Dual Speed System in operation on a Drive-In Rambler Rig equipped with a 65-ft. Kwik-Lift Mast.

Do you want to reduce your downtime and increase your profits? If so, have a good look at an Ideco Drive-In Rambler Rig. You'll find that Drive-Ins are most in demand wherever they are. Six Drive-In Models, ranging from 114 to 395 horsepower, are available for every job from "pulling rods" to "slim-hole" drilling. These rugged self-propelled rigs are famous for their ease and economy of operation. Same rugged engine, torque converter and transmission used for hoisting . . . also power the rig on the road. The forward-mounted Ideco Kwik-Lift Mast travels rigged-up. Hydraulically-raised and telescoped, the mast can be ready for operation in minutes. Ask your Ideco man for full details!

There is no Substitute for Quality

IDECO P. O. BOX 1331 DALLAS, TEXAS

DRESSER INDUSTRIES, INC.



THE growing petroleum industry's requirements for sound insurance protection have been met by Marsh & McLennan for more than half a century. Changing needs and unusual insurance problems in this period of industry growth have found their solution in Marsh & McLennan service.

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The packaged monitor measures 12 in. wide, 4 in. deep, and 7 in. high. Plug-in type of components are used. Source: **Scientific Glass Apparatus Co., Inc., Bloomfield, N. J., U.S.A.**

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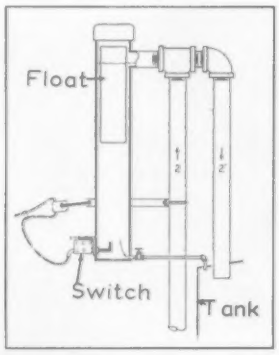


Pumpoff control for wells

. . . is on the market which, the maker says, will shut off power, either a gas engine or an electric motor, when a well pumps off. The control is designed to prevent unnecessary wear on a pumping unit, rods, and tubing, and to avoid the waste of power when there is no fluid in the well to be lifted.

Another feature of the control is that it shuts down the pumping unit should the sucker rods part, the pump become gas-locked or sanded up, the tubing plugged with paraffin, a flow line break, or mechanical failure of the pump jack, according to the maker. The Peerless well pump-off control is said to be simple in design, to have no wearing parts, and to be easy to install. Source: **Petroleum Instrument Co., 2200 West Alabama, P. O. Box 66252, Houston 6, Tex., U.S.A.**

•

Multipurpose gear lubricant

. . . developed in Germany and now on the market is said to combine the desirable properties of mild-additive gear oils together with the advantages of extreme-pressure hypoid oils.

The new gear oil is said to insure better protection of precision gears and to prolong the life of high-load hypoid gears. Too, the new Gasolin gear oil, designated MZ for multipurpose, is expected to simplify oil storage and prevent possible

mistakes in the use of lubricants. Source: **Deutsche Gasolin-Nitag AG, Postschliebfach 1, Jordanstrabe 32, Hanover, Germany.**

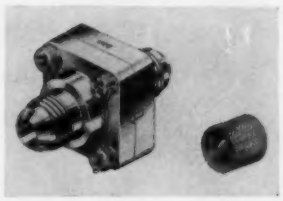
●

Internal protection for drill pipe

. . . is offered by a new thermosetting plastic coating, tradenamed TK-34. The coating was developed to withstand the caustic effect of high-alkalinity drilling fluids and the physical punishment inflicted in drilling operations.

The coating is claimed to have the necessary properties to withstand 100° torqueing on a 10-in. length, 3% elongation, and a resistance to fatigue failure that exceeds that of the steel to which the coating is applied.

The coating is said to have excellent adhesion to steel, to withstand a 30% caustic soda solution at 200° F., and to perform well in pressures up to 10,000 psi. at 300° F. The coating is primarily an epoxy-base type and applied at the maker's four plants. Source: **Tube-Kote, Inc., P. O. Box 20037, Houston, Tex., U.S.A.**



Miniature filter assembly

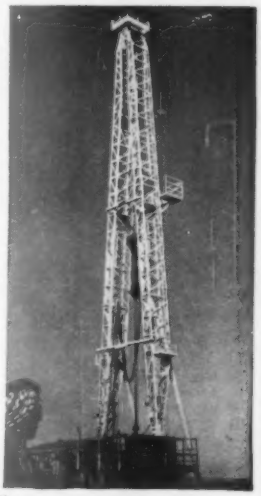
. . . developed for inline applications where caustic or corrosive liquids are handled, such as instrument and gaging points. Pressures may range up to 2,250 psi., the maker indicates. Temperatures may range from −350° up to 500° F.

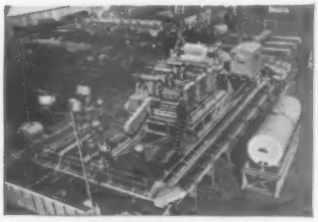
WOODFIELD

Complete Oilfield Drilling Installations

POWER WORKS • SLUSH PUMPS MUD SYSTEMS • UTILITY HOUSES CAMP EQUIPMENT • PIPE HANDLING TOOLS • SUBSURFACE EQUIPMENT.

All necessary Supplies for the Complete Operation.





IDECO WOODFIELD

Woodfield manufacture and supply the range of IDECO Rotary Drilling and Servicing Equipment under licence.

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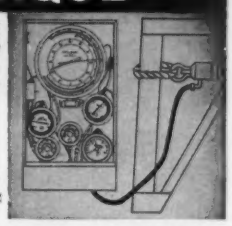
TONG TORQUE

THE MARTIN-DECKER TONG TORQUE ASSEMBLY FOR ALL CONNECTIONS

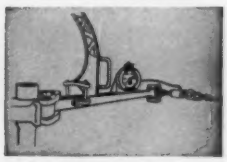
NE GAUGE for torque measurements of all size drill collars, drill pipe, tubing and casing.

ACCURATE AND RELIABLE readings with calibration checks seldom required.

CARE AND MAINTENANCE can be capably done by the drilling crews.



PERMANENT INSTALLATION The cylinder attached to the back-up line provides torque indication each time collars are run.

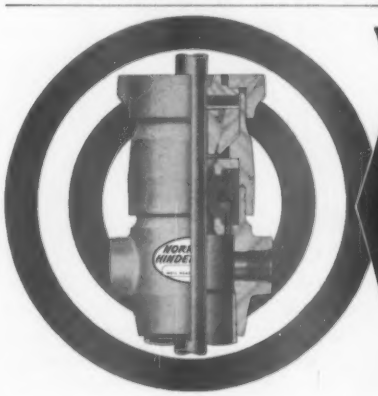


PORTABLE INSTALLATION The torque assembly attached to the tong itself can be used for spot checks on two or more rigs.

MARTIN DECKER

WRITE FOR DESCRIPTIVE LITERATURE D-P95
MARTIN-DECKER CORPORATION
3431 CHERRY AVENUE, LONG BEACH 7, CALIF.

World's principal manufacturer of Oil Well Drilling Instrumentation



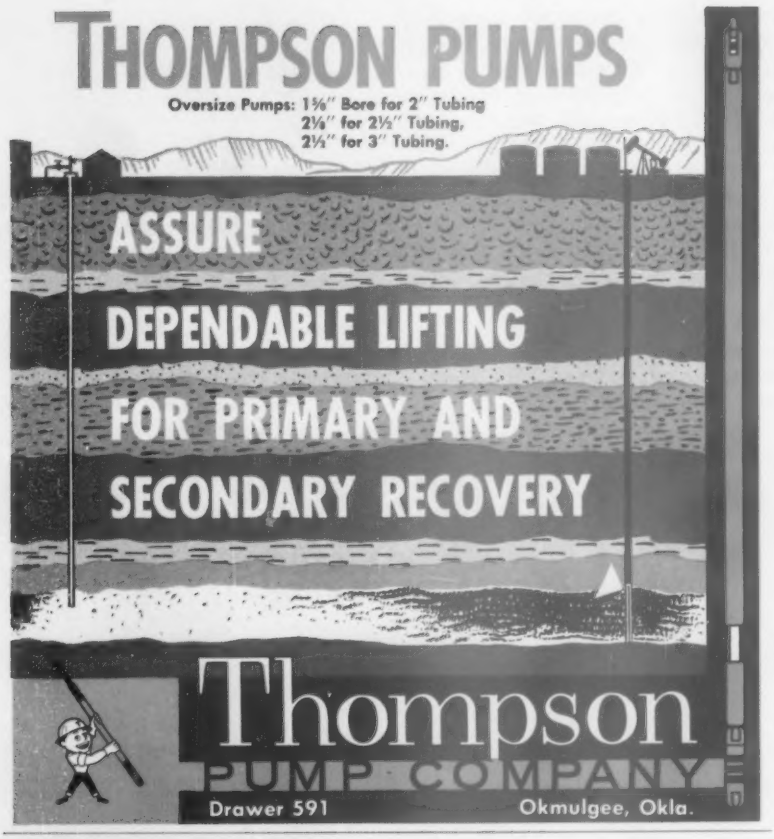
W. C. NORRIS

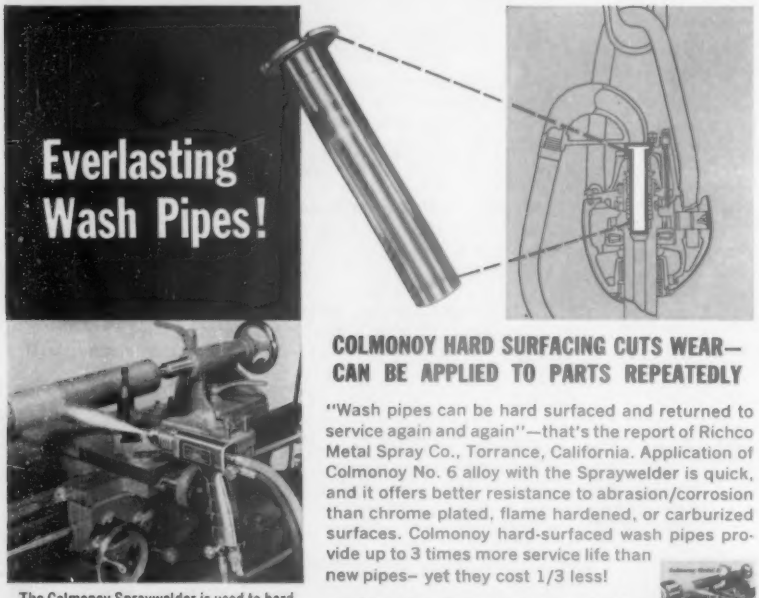
Target

ECONOMY • SERVICE • SAFETY

WRITE FOR NEW WELL HEAD BULLETIN P. O. BOX 1739, TULSA

TUBING & CASING **HEADS**




Everlasting
Wash Pipes!
COLMONOY HARD SURFACING CUTS WEAR—
CAN BE APPLIED TO PARTS REPEATEDLY
"Wash pipes can be hard surfaced and returned to service again and again"—that's the report of Richco Metal Spray Co., Torrance, California. Application of Colmonoy No. 6 alloy with the Spraywelder is quick, and it offers better resistance to abrasion/corrosion than chrome plated, flame hardened, or carburized surfaces. Colmonoy hard-surfaced wash pipes provide up to 3 times more service life than new pipes– yet they cost 1/3 less!
The Colmonoy Spraywelder is used to hard surface lathe-mounted oil field parts. After application, alloy is torch fused creating a welded bond between overlay and base metal. Alloy in rod form is used to overlay irregular surfaces.
Write us about your particular abrasion / corrosion problem. We'll recommend the proper alloy and even suggest a shop doing Colmonoy work near you. Get the Colmonoy Manual and Spraywelder Catalog.
HARD-SURFACING
& BRAZING ALLOYS
WALL COLMONOY
CORPORATION
19345 JOHN R STREET • DETROIT 3, MICHIGAN
Buffalo • Chicago • Houston • Los Angeles • Morrisville • New York • Pittsburgh • Montreal • London, England

The unit measures 1⅛ in. square and about 2 in. long. Except for an enclosed teflon washer which seals the two halves of the body together, the filter is made of stainless steel. A woven wire-mesh screen comprises the filter element. It is a cylindrical-shaped cup with a coned bottom. Filter surface comprises 1.2 sq. in. About one-half of this is open-flow area. Source: **Dumont Engineering Corp., 1401 Freeman Ave., Long Beach, Calif., U.S.A.**

●

Chlorine injector

. . . called the Chlorinjector is now available to feed hypochlorite into water systems. The device has been redesigned to include a longer-wearing Hypalon diaphragm to improve service.

According to the maker, once the unit is installed and the rate of feed proportioned, it operates automatically and requires only the replacement of the chlorine solution. A positive-displacement type, the unit is water-powered. It comes in two ratings: 20 and 30 g.p.m. Source: **H. E. Anderson Co., P. O. Box 1183, Muskogee, Okla., U.S.A.**

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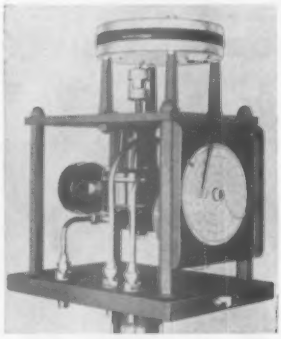

Continuous gas sampler

. . . on the market offers help in accurately determining the chemical and physical properties of gas. The Model M-R sampler, over 7 days, accumulates at a constant rate a sample of gas to a final pressure of

TOYO KANETSU SETS A NEW RECORD

200

TUBESEALS

TOYO KANETSU, Japan's leading fabricator of steel plate vessels and licensee for Hammond Tubeseal Systems*, sets a new record for Tubeseal installations throughout the Far East... more than 200, ranging in capacity from less than 2,000 barrels to more than 315,000 barrels for safe storage of gasoline, petrochemicals and other volatile products.

At least 25 of these 200 Tubeseals have a capacity of 150,000 barrels, or more. *Patented

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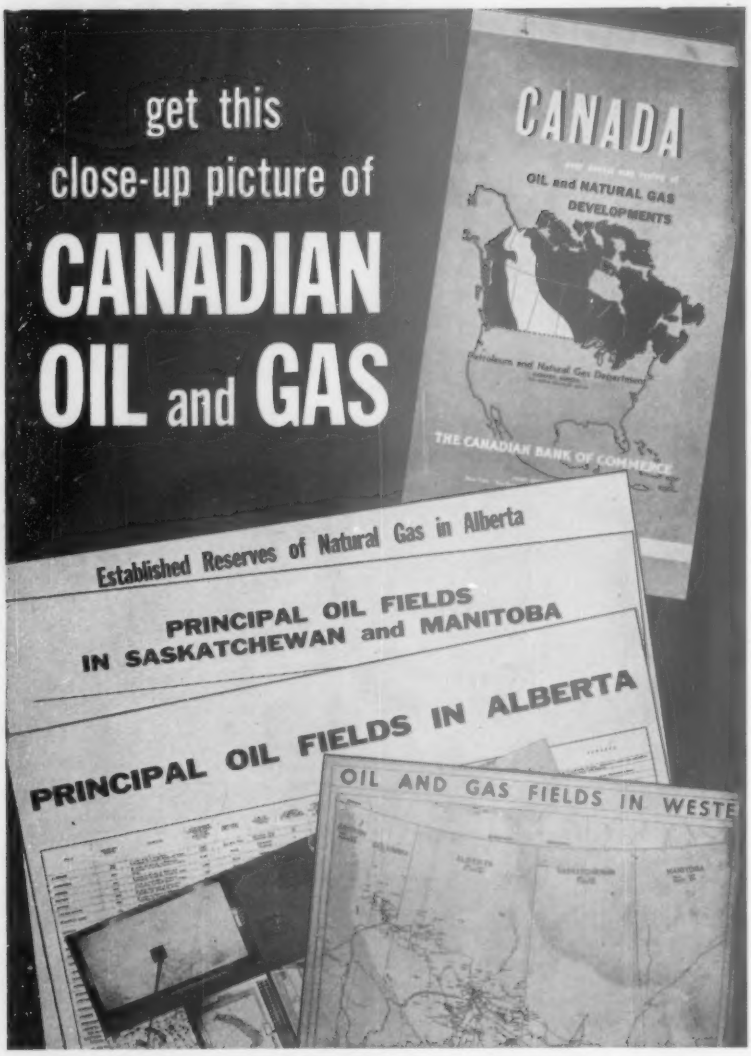

With a Petroleum and Natural Gas Department in Calgary staffed with technical men, and with nearly 300 of our branches located in Western Canada and the Northwest and Yukon Territories, we are in continuous touch with Canada's oil and gas developments. For information on any phase of the Canadian petroleum industry, please send your letterhead request for our complete and up-to-date review of developments. It contains our latest map, statistical data on the principal Canadian oil and gas fields, and a summary of the special services we offer to the industry.

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1512 Commerce Street, Dallas, Texas

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about 140 psig. from the sample source. The minimum pressure of the sampled gas must be at least 160 psig., the maker says.

Features include a mechanical drive and a pressure recorder in a single case. Sample pressure may range up to 150 psig. The gas sample is gathered into a portable container for easy access to the laboratory.

According to the maker, the instrument can be used in hazardous areas where vaporproof equipment is required as it needs no external source of power. Source: **Arcco Instrument Co., Inc., 7144 E. Condor, Los Angeles 22, Calif., U.S.A.**

•

Dehydrator for storage tanks

. . . removes the moisture from air taken into storage tanks as product is pumped out. This new development offers a way to prevent dilution and possible contamination of a tank's contents.

Desiccant material is held in a basket-like drawer with a wire-mesh top and bottom. It slides into a gas-tight housing.

Air drawn into the tank as product is pumped out, passes through the desiccant mass where it gives up its moisture. Moisture is adsorbed mostly into the pores of the desiccant. Consequently, flow efficiency of the vacuum relief system is practically unaffected, the maker says.

A layer of indicator material rests on top of the basketlike drawer. It is easy to see through a peep glass. The indicator material turns from blue when dry to pink and then to white when it becomes saturated with moisture. The dehydrator comes in seven sizes from 2 to 12 in. Source: **Johnston & Jennings Co., 350 Fifth Ave., New York 1, N. Y., U.S.A.**

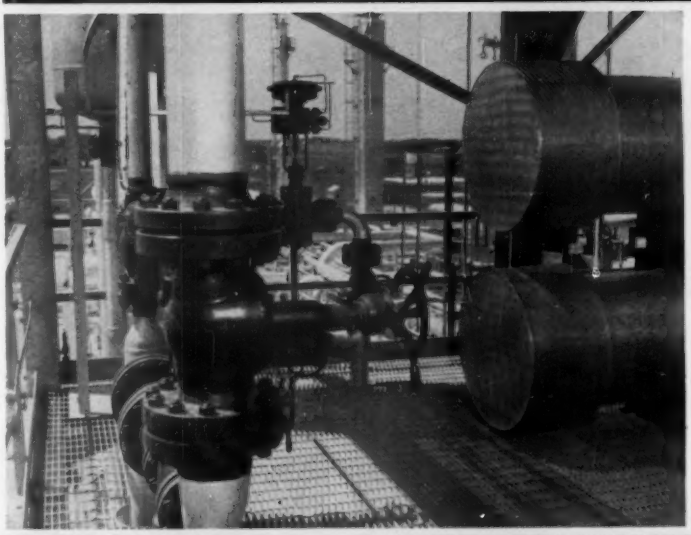
This Ammonia Refrigerant System Uses ORBIT

FOR BETTER OPERATION
SAFER, EASIER MAINTENANCE

ASA CLASS VALVES

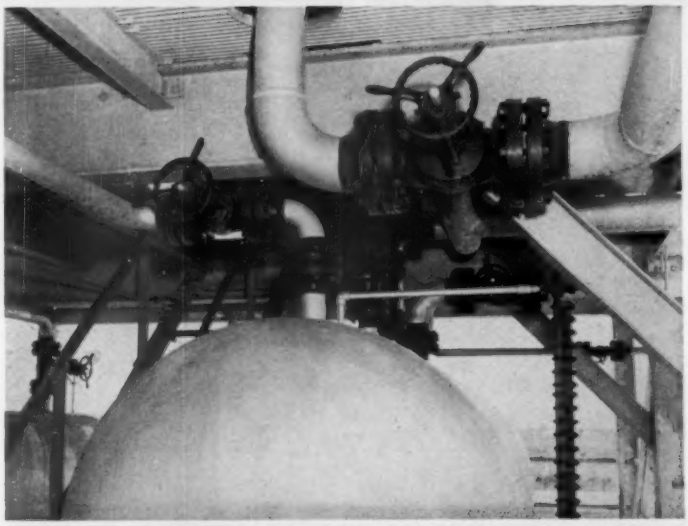
In addition to the services shown in these pictures of a Louisiana Gasoline Plant — ORBIT ASA CLASS VALVES are used in other areas of the ammonia refrigerant system, i.e.,

- Relief valves for ammonia condenser
- By-Pass control valves for strong aqua pumps
- Products storage and transfer valves
- Suction and discharge manifolds
- Relief valves for ammonia absorber
- Discharge valves — weak and strong aqua transfer pump



WEAK AQUA RATE CONTROL VALVE, NEAR SIDE AND AMMONIA STILL REFLUX CONTROL VALVE, FAR SIDE.

AMMONIA SURGE TANK AND RELATED PIPE.



WHERE VALVE SPECIFICATIONS DEMAND NO LEAKS/NO LUBRICANTS, ORBIT ASA CLASS VALVES FILL THE BILL!

ORBIT VALVE COMPANY

ORBIT VALVES

P. O. BOX 699 / TULSA, OKLAHOMA
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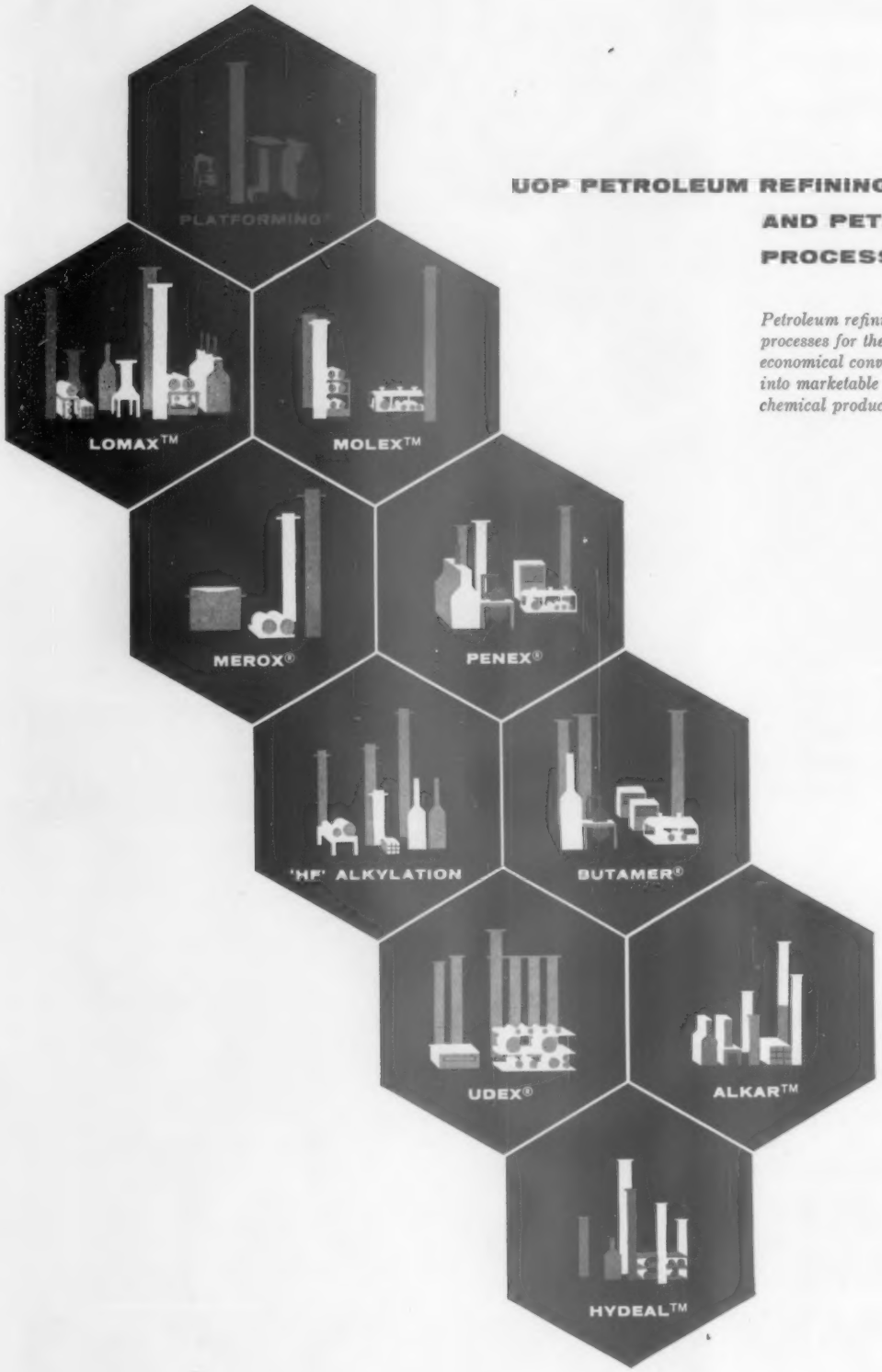
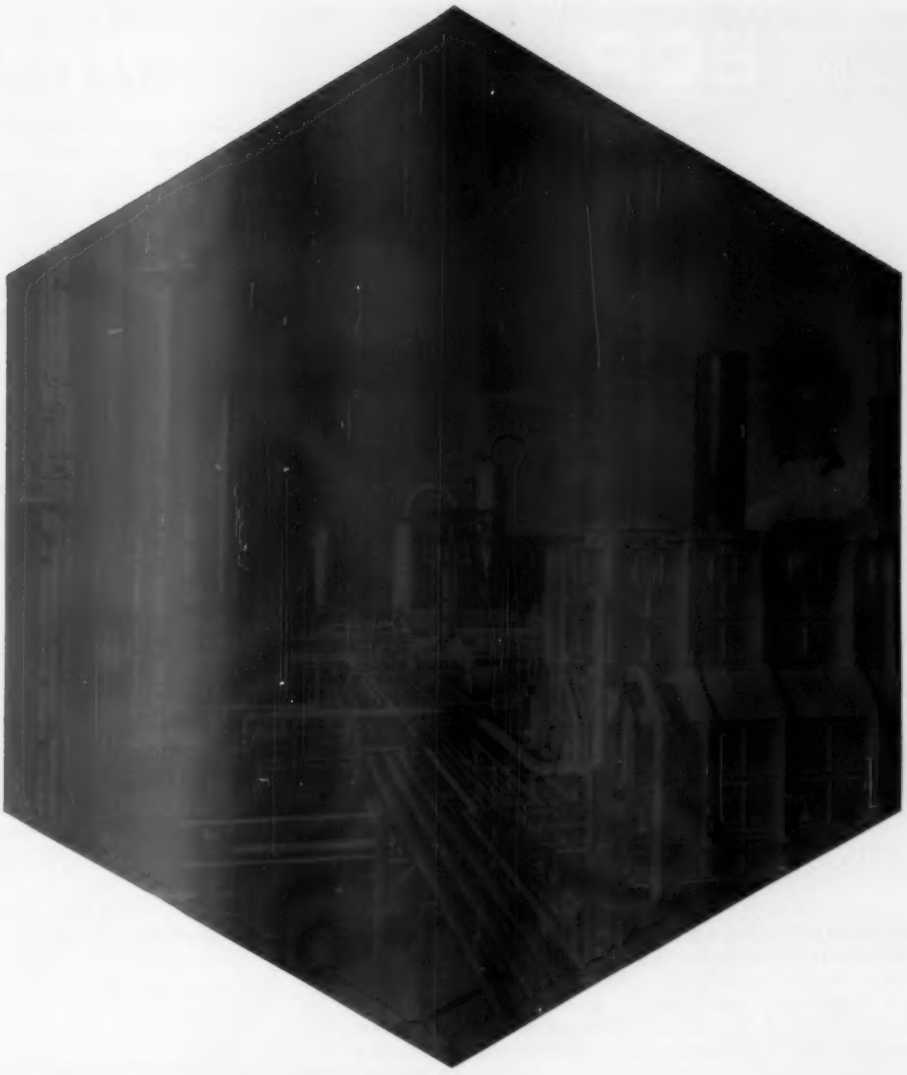


UOP PETROLEUM REFINING AND PETROCHEMICAL PROCESSES

Petroleum refining and petrochemical processes for the efficient and economical conversion of petroleum into marketable fuel and chemical products.



meet the demand for quality gasoline with Platforming

Marketing petroleum products in the sixties promises to be a tight competitive race for quality. Processing will be pushed more and more to produce products that are of top quality, high octane and yet are profitable to produce. Platforming, designed, engineered, and licensed by UOP, produces top quality Platformate for high energy performance.

Now is the time for refiners to evaluate their processing capabilities with the proposed future demand for the better gasoline products. Platforming enables a refiner to make a larger percentage of top quality gasoline and petrochemical intermediates . . . more profitable products.

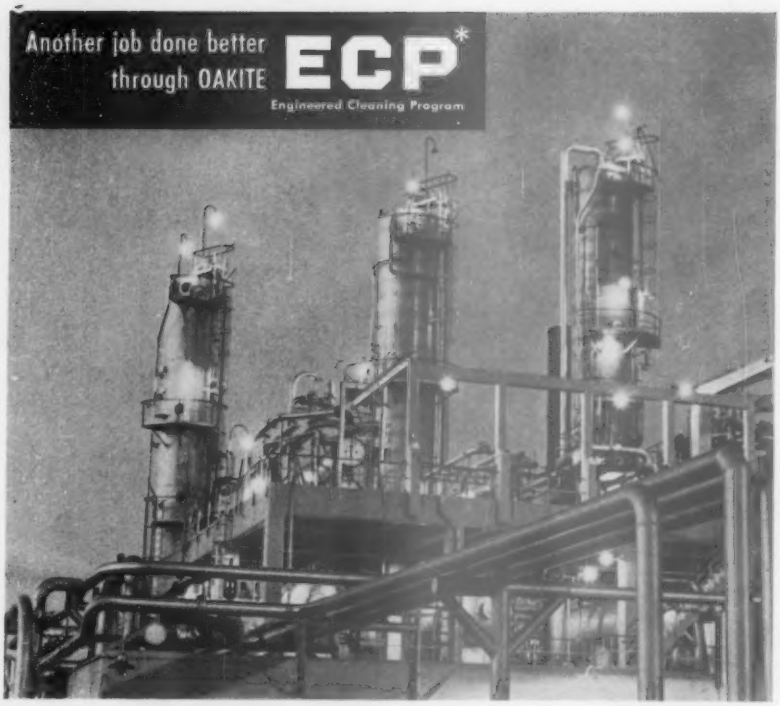
Platforming is economical to install, reliable and easy to operate. The process utilizes a platinum containing catalyst, that is highly active and hence provides a truly continuous operation. Platforming can handle the full boiling range gasolines without prefractionation, or naphtha cuts separated from them. Any refinery naphtha feed can be processed efficiently by Platforming.

With more than a score of different processes UOP can offer you the most profitable method for either employing your existing facilities or for an entirely new operation. Let UOP engineers evaluate your processing needs now.

WHERE RESEARCH TODAY
MEANS PROGRESS TOMORROW

UOP®

UNIVERSAL OIL PRODUCTS COMPANY
30 Algonquin Road, Des Plaines, Illinois, U.S.A.



Refinery in tough turnaround saves morale . . . plus $6,000

A refinery was experiencing a near morale breakdown in a tower turnaround. Twice yearly a squad of 20 disgruntled "volunteers" made its way through the tower, shoveling out deposits 8 inches thick. Boilermakers followed, dismantling the interior for off-site chipping and tank cleaning. Some men suffered irritations from contact with caustic. The work was back-breaking, tedious—expensive, too . . . totaling $13,000 for this one tower. But saving money was incidental; saving morale was more important.

The Oakite man recommended in-place chemical cleaning by circulation, using solution of Oakite 79 . . . a highly effective remover of asphalt and carbon soil combinations. Solution was cascaded over trays and bubble caps and through downcomers. Result: about 80% perfect *after just 10 hours of circulation.* Savings in morale: invaluable. Overall saving in dollars: $6,000.

And so, through an Oakite Engineered Cleaning Program, this refinery not only solved the morale problem, it made substantial dollar savings, too.

*Oakite ECP is a comprehensive cleaning program engineered to fit your particular operation under the experienced supervision of a local Oakite man. ECP covers every cleaning need. For details, write Oakite Products, Inc., 44C Rector Street, New York 6, N. Y.

OAKITE
over 50 Est. 1909 years' leadership in industrial cleaning
SCIENCE

OAKITE ECP benefits you from the ground up . . .

at drilling site it speeds such salvage operations as paint stripping, rust removal, degreasing

it restores pipeline efficiency through chemical cleaning... it simplifies pump station housekeeping

SHOWCASE . . .

New Literature

Controlled-friction casing hangers

. . . and casing heads are featured in an available eight-page brochure. It defines the "controlled-friction" principle and explains its advantages with graphic illustrations. Brochure 204 includes casing-head and casing-hanger specifications and performance curves on casing hangers under full working pressures. Source: **McEvoy Co., Box 3127, Houston 1, Tex., U.S.A.**

Storage containers for volatile liquids

. . . said to be capable of cutting evaporation loss by 94% are explained in a new bulletin just published. The 24-page literature describes features of double-deck, pontoon, and pan types of floating roofs along with metallic and fabric sealing devices. It's illustrated with detailed drawings of floating-roof accessories and photographs of structures now in service. Source: **Chicago Bridge & Iron Co., 332 S. Michigan Ave., Chicago 4, Ill., U.S.A.**

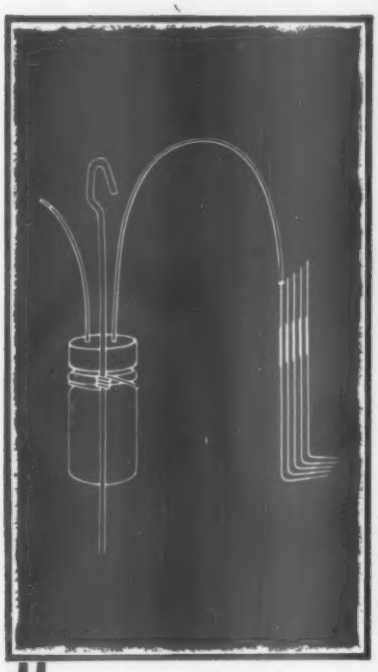
Equipment catalog

. . . free upon request, contains descriptions, detailed engineering data, parts price lists, and numerous illustrations of oil-field equipment. Strongly bound and printed in large type on heavy paper, the catalog is confined to essential data and every listed item is priced and identified by an individual part number. Exploded-parts drawings assist in quick identification of replacement parts. The publication outlines setting and removal procedures and provides a surface-setting stroke table for each type of packer offered. Source: **Guiberson Corp., 1002 Forest Ave., Dallas, Tex., U.S.A.**

Packer milling tools

. . . are described in new Bulletin 383. According to the manufacturer, the tools can reduce millover time of a production packer or bridge plug by as much as 75%. The bulletin gives actual case histories in which operators report that the tools resulted in substantial savings of time. A newly developed milling

CANNON PENS



UP TO A YEAR WITHOUT REFILLING

Cannon Meter Pens are easily installed as original or replacement equipment in all standard recording instruments. Produce accurate charts of maximum legibility. No blurring or smearing.

- Ends unrecorded intervals. Unaffected by pulsating flows, chart speeds, or rapid pen movement.
- Sealed ink supply prevents clogging from atmospheric contamination.
- Two-way capillary action ink flow eliminates smearing, blurring.
- Available in five sizes and angles. Special pens designed to customer specifications on request.

Write today for information.

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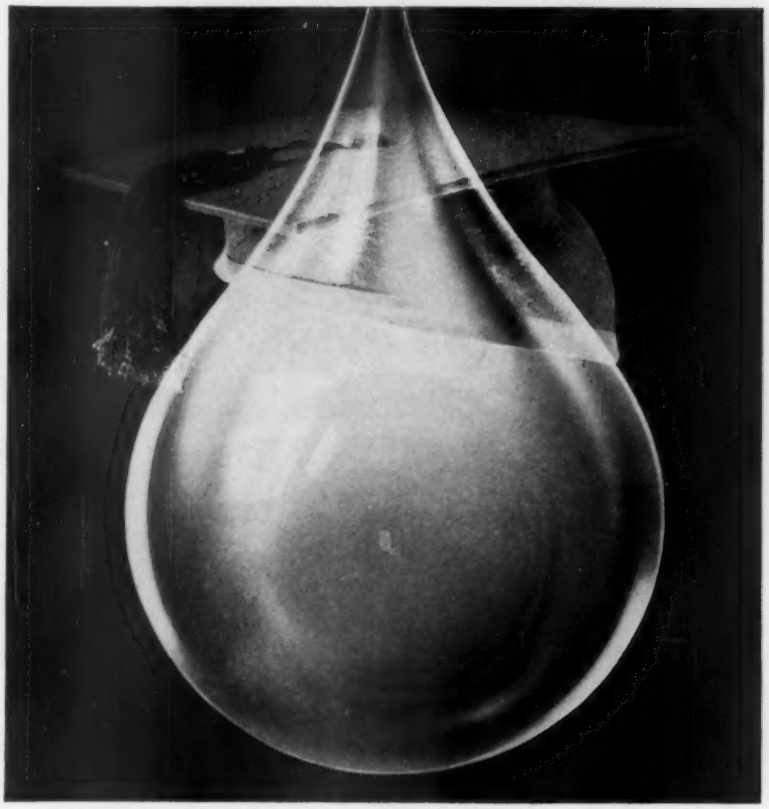

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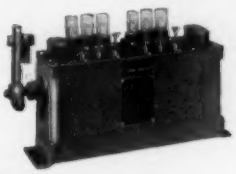
Just put it through a Manzel force-feed lubricator and any oil drop knows where it's going and how to get there fast. Manzel lubricators deliver just the right amount of oil to bearings, cylinders and packings. They start, stop, speed up and slow down in perfect synchronization with your machinery...unaffected by high steam, gas or air pressure. Whatever your field, there's a Manzel lubricator to meet your needs. For our catalog, write Manzel, 258 Babcock Street, Buffalo 10, New York. Whatever your lubricating problem, you get the right answer if you



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2

REASONS WHY YOU GET MORE WITH A HARBISON-FISCHER

Double-Displacement® PAT. ROD PUMP

When a conventional rod pump will no longer produce enough fluid to make the oil allowable, many operators save money by running a Harbison-Fischer Double-Displacement® Rod Pump instead of installing a tubing pump.

The pump is especially efficient where it is desired to lift a greater volume of fluid in order to increase daily oil production. The Double-Displacement has all the production advantages of a full-volume tubing pump, plus the operating advantages of an insert pump that can be run and pulled on the rods.

The pump is also often run when it is desired to produce the same volume of fluid, but at slower pumping rates. By operating old or aging pumping units at slower speeds their service life can be increased, and maintenance costs will be decreased.

The Double-Displacement is a traveling barrel, bottom hold-down assembly with two plungers and two barrel tubes which work simultaneously with a single set of valves. Pumps are available in a wide range of metal-to-metal, H-F Flexite®, or soft packing plungers, with chrome-plated or heat-treated barrel tubes in 2″ x 1½″, 2½″ x 2″, and 3″ x 2½″ sizes.

One installation will convince you that a Double-Displacement Rod Pump is the "Best Pump in the Oil Patch"® for large-volume production. You can obtain full details, illustrated literature, and comparative production data without obligation from your store, one of our many factory representatives, or by writing us at Box 2477, Fort Worth.

"BEST PUMPS IN THE OIL PATCH"®

HARBISON-FISCHER MFG. CO., FORT WORTH

shoe is dressed with a special milling carbide compound whose cutting surface remains 100% effective throughout the entire milling job, the maker reports. Source: **Baker Oil Tools, Inc., Box 2274, Terminal Annex, Los Angeles 54, Calif., U.S.A.**

Making Sound Behave

. . . is the title of an available eight-page literature piece which tells the story, complete with pictures, of a newly released sound-slide film. Booklet F-10180 is packed with general information on air-distribution sound levels. Source: **Barber-Colman Co., 1300 Rock St., Rockford, Ill., U.S.A.**

Dehydrators

. . . are designed so air taken into storage tanks, as the product is being pumped out, passes through a desiccant mass that removes moisture, thus preventing dilution and possible contamination of tank contents. Bulletin 500-5-0 (6 pages) gives information on flow capacities, adsorption rates, dimensions, and installation. Source: **Johnston & Jennings Co., 350 Fifth Ave., New York 1, N. Y., U.S.A.**

Diesels for small trucks

. . . are covered in a new booklet now being offered to interested persons. The publication contains reports from operators who have converted to diesel power, along with a series of charts covering price, fuel and maintenance savings, and yearly return on investment. The charts should help other operators to figure increased profits they might expect on their own operation by converting to Series 53 diesels. Source: **Detroit Diesel Engine Div., General Motors Corp., 13400 W. Outer Drive, Detroit 28, Mich., U.S.A.**

New foaming agents

. . . which generate foam when natural gas or air passes through a solution containing one such agent, are discussed in a new two-page product-data sheet obtainable now. The literature introduces the products and tells where they are used, advantages, physical properties, case histories, packaging and availability, and prices. Sources: **Dowell Division of The Dow Chemical Co., Box 536, Tulsa, Okla., U.S.A.**

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IT'S THE FINEST ROTARY HOSE MADE

Goodall Rotary Hose is the finest hose made—a strong statement, but one that is proven day after day, year after year.

Because Goodall is *the top quality rotary hose* you receive a one-year warranty with each Goodall hose you buy. A warranty that contains no limits on working pressures. Only the finest hose made—only Goodall with its high burst pressure built into the hose—could make this guarantee. Why not make your next rotary hose Goodall; you get greater value for each dollar spent when you do.

These exclusive features are available *only* with Goodall Long-Life Rotary Hose:

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The Goodall Safety Clamp

The Goodall Repair Service

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Equipment Men Notes

MAMMOTH PIECE OF EQUIPMENT is this meta-orthoxylene splitter, fabricated by Flint Steel, of Tulsa, for Badger Mfg. Co. Delivery was made to Lake Charles, La. by three different railroad lines in a carefully timed and scheduled daylight movement. The vessel, built complete in Flint's heavy plate bay, has an over-all length of 208 ft., 8 in., an outside diameter of 11 ft., 1⅞ in., and weighs 367,000 lb. It's fabricated of 9/16 and 15/16-in. steel plate and contains 122 trays. When erected its height is equal to that of a 20-story building, 220½ ft.

INDUCTED INTO NOMADS as regular members in Los Angeles recently were four newcomers. Standing between Ritual Master Charlie King, of Baker Oil Tools (right), and his assistant, John Cochran, of Drilltrol, are: (from left) Andy B. Campbell, Hillman-Kelley; James T. Streger, BJ Service; James E. Sayers, Smith Tool Co.; and Donald J. Dunlop, Baker Oil Tools.

Stone & Webster Service elects . . . Peter J. Rempe chairman of the board and chief executive officer, and Lucius S. Storrs, Jr., president

P. J. Rempe

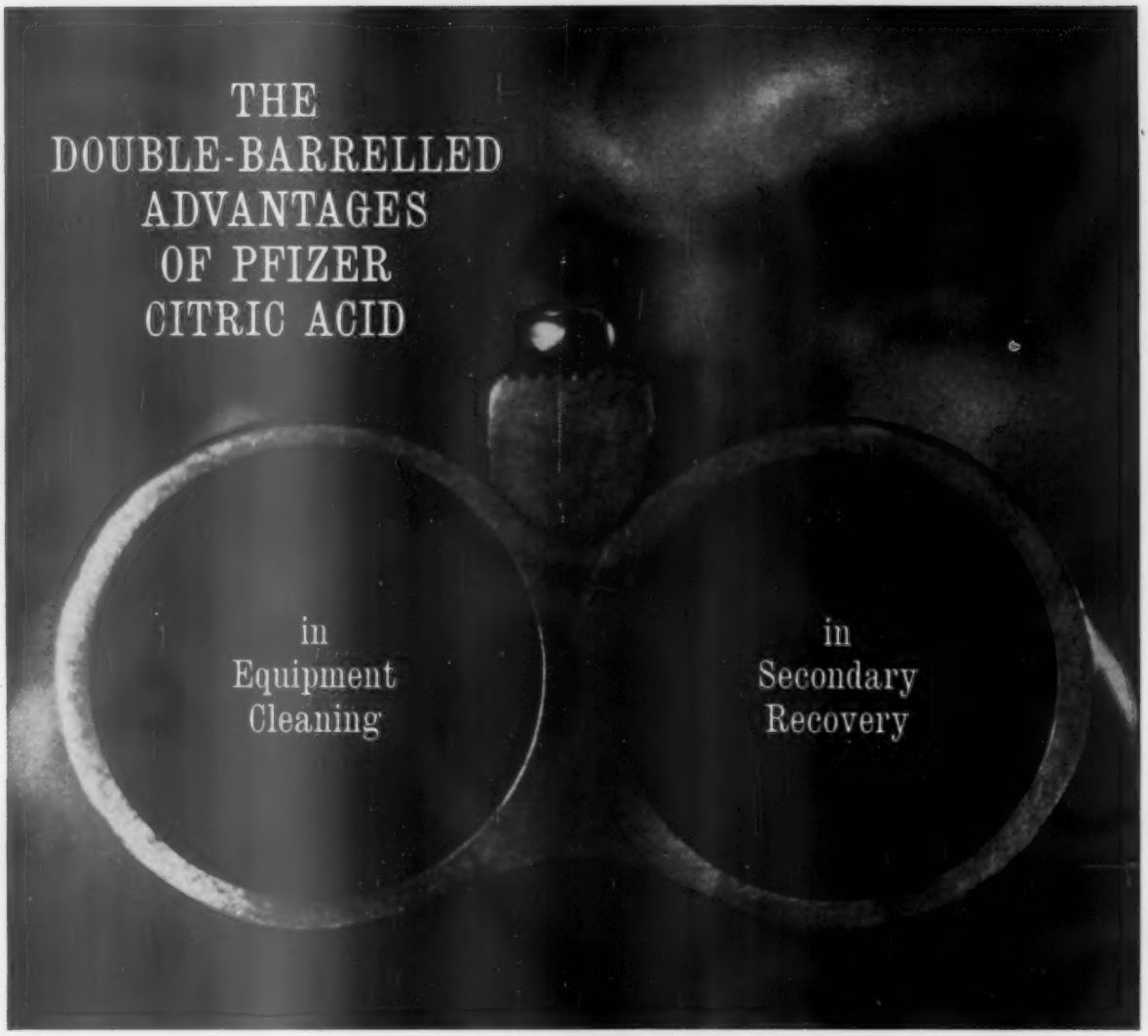
L. S. Storrs, Jr.

of the firm. Rempe had been president and Storrs executive vice president of the corporation, which is the management-consulting subsidiary of Stone & Webster, Inc. As chairman, Rempe succeeds Richard N. Benjamin, who became president of Stone & Webster, Inc.

Rempe joined the firm in 1928 and was elected a vice president of Stone & Webster Service Corp. in 1939. He became senior vice president in 1954, a director in 1957, and president in 1959. His first employment was with El Paso Electric Co. Storrs went to Stone & Webster in 1933, was elected a vice president of the service corporation in 1954, and a director and executive vice president in 1959.

Robert L. Boyd is appointed . . . executive vice president and general manager of Guiberson Corp., announces F. G. Fabian, executive vice president of Dresser Industries, following the resignation of Alex Smith who formerly served in this capacity. Boyd's former business associations

R. L. Boyd



●● Pfizer Citric Acid today is rapidly becoming a more useful product for the petroleum industry. Not only is it an excellent chemical cleaning agent for petroleum refining equipment, but its long established use in secondary oil recovery continues to grow.

In cleaning petroleum refining equipment, citric acid effectively dissolves scale and corrosion deposits. Citric acid also prevents the reprecipitation of dissolved scale. It will not cause chloride stress corrosion cracking. Consult your chemical cleaning service company regarding these and other advantages of cleaning equipment with Pfizer Citric Acid.

●● In secondary oil recovery, Pfizer Citric Acid prevents sandface plugging caused by iron in the injection water. The results:

- higher injection rates
- lower injection pressures
- less frequent downtime on filters
- less replacement of parts due to rusting
- reduced frequency of costly acidizing or fracturing operations

Pfizer Citric Acid sequesters iron more efficiently and economically than any other chemical. It is non-toxic, water soluble and easily handled.

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Branch Offices: Clifton, N. J.; Chicago, Ill.; San Francisco, Calif.; Vernon, Calif.; Atlanta, Ga.; Dallas, Tex.; Montreal, Can.

Write Pfizer for details on the use of citric acid in chemical cleaning or in water flooding applications.

I want to learn more about the use of Pfizer Citric Acid for chemical cleaning and in secondary oil recovery.

Please send me:

☐ Technical Bulletin 102: "Pfizer Products for Chemical Cleaning"

☐ Technical Bulletin 97: "Pfizer Products for Petroleum Production"

OG

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include American Sterilizer Co., Turner Corp., and Lehigh Coal & Navigation Co.

Glenn R. Gammill assumes job

. . . as sales representative for Wolverine Tube Division of Calumet & Hecla, Inc., announces G. W. Overstreet, sales manager of the Dallas district. With headquarters in New Orleans, Gammill will service Louisiana, a section of eastern Texas, and southern Arkansas, marketing copper, copper alloy, and aluminum tube.

Howard E. Midkiff is promoted

. . . sales manager of Cal-Metal Pipe Corp. of Louisiana, moving up from his former post as Tulsa district sales manager. The announcement comes from Kenneth S. Bayless whom he succeeds. Bayless moves up to executive vice president.

H. E. Midkiff

A veteran in the petroleum and heavy-equipment industries before joining Cal-Metal, Midkiff was branch manager of an equipment company in Tulsa, and was employed by an oil and refining company in Oklahoma and New Mexico.

2 sales representatives named

. . . by Pete Sublett & Co., Houston marketers of pipe to the oil and gas industry. George Roman, co-author of the book, "Macaroni Tubing," was formerly with Vinson Supply and Hydril Co. Harry Landers was with Longhorn Machine Works.

Jamesbury Corp. appoints two

. . . to executive sales positions, reports Julian S. Freeman, vice president and general sales manager of Jamesbury, manufacturer of Double-Seal ball valves.

M. H. Reck

W. G. Hurd

Maxwell H. Reck, assistant sales manager for the past 3 years, has been named sales manager. Taking Reck's former job is W. G. (Bill) Hurd, previously district sales manager for the southeastern U. S. Both men will be based at the firm's headquarters in Worchester, Mass.

Otis Engineering Corp. appoints

. . . C. W. McComas as packer sales coordinator, and Wallace Robertson as gas-lift manager, both to headquarter in Dallas at Otis' home offices. McComas was previously located in Oklahoma City where he supervised sales and field engineering for packers and bridge plugs in the Oklahoma-Kansas area. He's a veteran of 15-years experience in various capacities with oilfield-engineering and sales companies.

In his new capacity, Robertson will be in charge of Otis' gas-lift-sales division and will serve as liaison between the company's field sales force and the Dallas-based engineering and manufacturing facili-

1 OF 6 WAYS TO DRILL OFFSHORE

. . . and drill *economically* and *efficiently*. THE OFFSHORE COMPANY has a quarter-century of drilling experience, including 14 years in marine drilling. World-wide in scope, OFFSHORE will furnish the right combination of drilling unit, engineering and operations staff for *your* drilling situation.

TENDER and PLATFORM

Second oldest of the 6 offshore drilling methods, the Tender and Platform are regaining a well-earned place in the industry, becoming more prevalent in deep-water operations. THE OFFSHORE COMPANY can provide this type of tool, including design and construction of dependable, minimum size platform if requested, for use in water up to 200 feet deep.

OWNERS AND OPERATORS OF THE LARGEST FLEET OF DEEP-WATER MOBILE DRILLING UNITS IN THE WORLD

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Yellow Strand®

on Exeter's "packaged" Rig No. 3

...AND ON ALL THE OTHER EXETER RIGS, TOO!

"We use Yellow Strand Wire Rope exclusively on all five of our rigs and in all our jobs," says Lee Naylor, tool pusher for Exeter Drilling Company's new Rig No. 3, drilling near Farmington, New Mexico. "Working against time and on a low-profit margin, we can't afford any downtime. Yellow Strand is definitely giving us excellent service."

Packaged for fast moves and quick rig-up, this latest design electric-drive medium-depth rig is equipped with 5000' 1⅛" 6 x 19 Yellow Strand IWRC Rotary Line, plus ½" 6 x 31 Tong and Safety Lines.

To get the maximum number of round trips and maintain highest possible ton-miles, Exeter Drilling specifies Yellow Strand. They have proved this wire rope does all required of it because it is tougher, stronger and more uniform. Yellow Strand can meet your wire rope needs, too. See your local Continental-Emsco supply store soon. Broderick & Bascom Rope Co., 4203 Union Blvd., St. Louis 15, Missouri.

Yellow Strand®

WIRE ROPE

CEco.

ties. Robertson was previously gas-lift-sales specialist in the Texas-Gulf Coast area, having joined Otis in 1956.

Worthington Corp. appoints

... Acme Foundry & Machine Co., of Coffeyville, Kans., as distributor of oil-field products. Acme Foundry will continue to handle Worthington's power - transmission products as well as the new franchise for a full line of oil-field equipment, including pumps and small compressors.

Thermco, Inc. formed in Tulsa

... to design and engineer process heaters for the petroleum and petrochemical industries. Principals in the new firm are William H. Mason, John J. Griffin, and Edwin H. Stabert. Mason, who heads the sales department, continues to operate William H. Mason Co., a Tulsa sales-engineering group which he founded in 1949.

Griffin, chief combustion and process engineer with National Airoil Burner Co. and Petro-Chem Development Co. since 1945, will handle process design details. Stabert has specialized in structural and piping flexibility design for process equipment since 1948. He formerly was senior structural engineer at Petro-Chem.

Carl D. Ward becomes manager

... of Information Systems, Inc.'s Computer Division, in which post he will have full responsibility for all division operations, announces Doane R. Gero, president of ISI. Formerly chief engineer of the Computer Division, Ward will continue to operate in this capacity as division manager.

C. D. Ward

The newly appointed division manager has had prior associations with Burroughs Corp., Radio Corp. of America, Minneapolis-Honeywell, and Delco Appliance Division of General Motors.

Electric Specialty Co. names

H. W. Thode

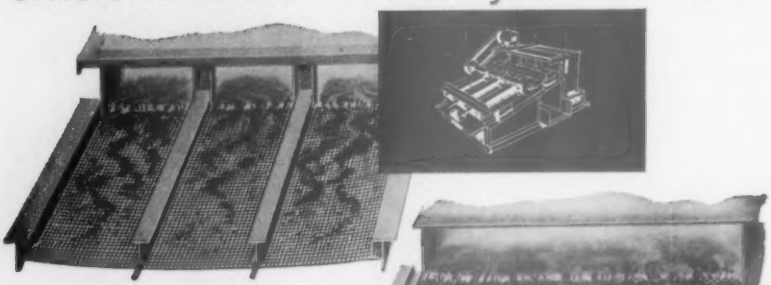
...Herbert W. Thode as general sales manager. He has been with the parent organization, Electronic Specialty Co., as eastern sales supervisor for the past year, and was formerly contract and product sales manager for Avion Division of ACF Industries, Inc. Thode has held sales posts with U. S. Electrical Motors, International General Electric, and Marathon Electric Mfg. Corp.

Grove names 2 sales engineers

... in the persons of Len E. Brock and Robert Churnside. Brock, named regulator sales and service engineer for the Permian basin area, previously was with Burt Tank Separator & Oil Treating Corp. He has had more than 15 years of oil-field experience.

Churnside joins Grove Valve & Regulator Co. as sales engineer in Chicago from where he will cover the midwestern United States. He formerly was with F. H. Maloney Co. in Houston.

here's why "RUMBA" is the most efficient shale shaker you can own



"RUMBA" Under-Slung Screen.

Conventional Over-Slung Screen.

"RUMBA" is the only shale shaker that evenly distributes the drilling fluid over the entire screening area. This gives you a more effective separation of cuttings with a high rate of flow.

"RUMBA" is the only shale shaker equipped with an under-slung screen cloth. The heavy steel struts above the screen: 1) Provide 20 lineal feet of rigid driving surface; 2) Prevent whipping or flexing of the screen; 3) Control distribution of drilling fluid over the screen.

"RUMBA" is the only shale shaker equipped with a De-Sander and a Sample Catcher. Hutchison Manufacturing Company's patented De-Sander removes tons of sand. Effects substantial savings in the maintenance of pumps, swivels, and other equipment!

"RUMBA" Shale Shakers are quality-built for years of dependable service. The first "RUMBA" Shale Shaker built is still in operation after 22 years of efficient service. If you want the most efficient shale shaker you can buy, *specify* "RUMBA".

"RUMBA" Shale Shakers and "FLOLIGHT" Derrick Lighting Systems are sold through supply stores everywhere.

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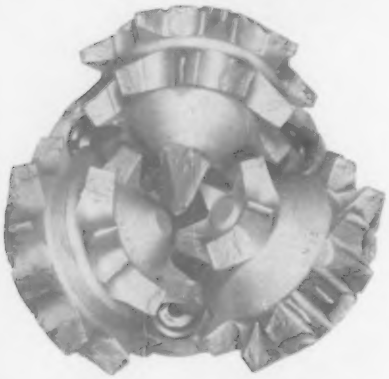

Smith TYPE DT ROCK BITS

FOR SOFT FORMATIONS

The SMITH TYPE DT 3-cutter rock bit is designed and constructed to insure rapid rates of penetration in moderately soft to soft formations...sturdy, deeply cut and widely-spaced teeth...optimum self-cleaning properties are provided by the widely-spaced teeth in combination with ample tooth deletions and efficient flushing action of the circulating fluid.

Smith TOOL CO.

A Division of SMITH INDUSTRIES International Inc.

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Branches in Principal Oil Centers Throughout the World

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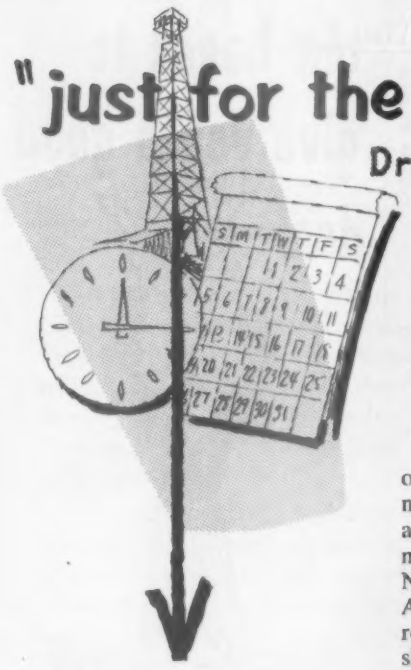


IT'S THE TIME of the year to review past performances.

When you take stock of accomplishments during 1960, you'll notice that new drilling records have been set. Let's check the scoreboard:

On the Louisiana Gulf Coast a drilling contest has been keenly competitive—several contenders have vied to see who could drill from spud to 10,000 ft. in the shortest time. Records in this event fell several times during the year. At last report, Rowan Drilling Co. tentatively is wearing the champion's belt with a slick time of 3 days and 12 hours to drill 10,000 ft. of hole. (For stories on Gulf Coast records see OGJ, January 11, 1960 p. 44; May 23, 1960, p. 146; July 18, 1960, p. 66; and October 17, 1960, p. 92.) It is significant that little more year ago drilling time to 10,000 ft. was nearly 13 days.

Another drilling challenge was the amount of hole drilled during a day. Prime contender for this honor is Dixie Drilling Co. Rig 3. While working in Timbalier Bay, La., this rig drilled 5,412 ft. in a day, with 5,114 ft. on one bit.

The record for the footage drilled during an 8-hr. tour has never received too much attention. Whether or not it's a world record, a fair mark to shoot at was the one set by a combined Indian and British 10-man crew who drilled 2,393 ft. in Northeast India in early 1959 for Assam Oil Co. This broke an older record of 2,305 ft. in an 8-hour shift by a California crew in the Los Angeles Basin. (See OGJ, January 26, 1959, p. 223.)

Take a look at the record for the most footage drilled by a single rig in a year. It would seem as though the Gulf Coast, or a similar area of warm climate and minimum of hampering weather conditions, would be the scene for this pacemaker. Not at all—Colorado's Denver basin was the site of the victor in this department. A Denver firm, Chandler & Simpson, lay claim to the crown with 296,342 ft. drilled in 47 wells. This figure includes 20,576 ft. of 12½-in. surface hole and 544 ft. of core hole, which was done during 1959. This one-rig work was done in some pretty foul weather. The temperatures on the eastern plains of Colorado dropped to −29° during the winter months where just getting into location can be a problem with mud and drifting snow.

Honorable mention for the Number 2 spot to D. J. McDuffie, Inc., Plaquemines, La., whose rig drilled 278,307 ft. in 1960 while drilling 33 wells. The holes were in the 7,000-to-10,500-ft. range in southern Louisiana. In 1956 the American record for one-rig annual footage was considered to be 125,465 ft. The Soviets thought they had bested this mark in 1957 with 128,-

"Instant Acid" easy to use—easy to handle—easy to store

Here is an acid designed by Dowell especially for use in remote areas where transportation makes the use of regular acids impractical.

"Instant Acid"* is packaged in dry form for safety as well as ease and economy in transporting, handling and storing.

"Instant Acid" is offered in two formulations: U-45, which yields an acid similar in effect to Dowell regular acid; and U-44, which yields an acid similar in action to Mud Acid.

"Instant Acid" is especially useful for small "dump" jobs or in wells where large quantities of acid and special pumping equipment would not be practical.

For full details, call your nearest Dowell representative.

*DOWELL TRADEMARK

PRODUCTS FOR THE OIL INDUSTRY

DOWELL

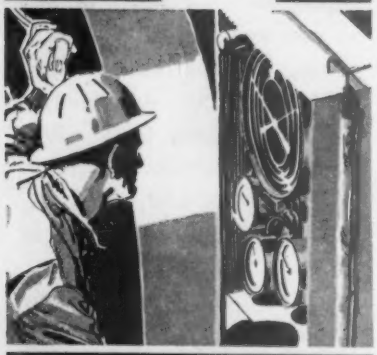
DIVISION OF THE DOW CHEMICAL COMPANY

WHEN YOU ENCOUNTER EXCESSIVE TORQUE, DRAG OR THE HAZARD OF STICKING DRILL PIPE AND CASING . . . .

SOUTHWESTERN

92

FLAKE GRAPHITE



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572 ft. of hole while drilling in the Kuban Steppe near Krasnoder. Actually, after final tally, Chandler & Simpson discovered it had drilled 216,524 ft. in 1956. Also, C&S drilled 238,265 ft. in 1957 and 267,427 ft. in 1958. Another firm, Garvey Drilling Co. of Great Bend, Kans., pushed the Russians further down on the honor roll by drilling these footages in 1957: Rig 16 made 144,289 ft., Rig 19 dug 159,-915 ft., and Rig 17 drilled 169,-924 ft.

State depths. On page 114 in this issue of the Journal is the annual chart of depth records by states. Although 1960 was not an exceptional drilling year, there were some shattered records.

Seven marks fell in the United States and Canada last year. One is a national record (Canada's deepest), two are new state scores, and three are sectional depth records.

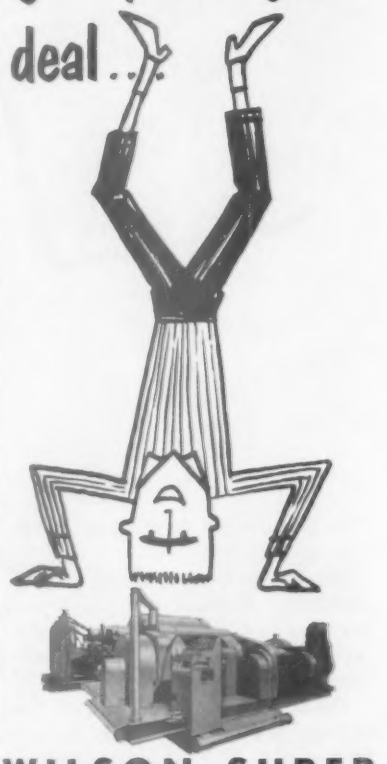
The depth-record well for Canada was the Cal-Standard Fording Mountain test in British Columbia. This hole was dry at 16,100 ft. It surpassed the previous mark set by Phillips in the same province in 1958, which was dry at 14,753 ft. at the 1 Puggins.

Illinois' old mark of 7,682 ft. set by a producer in 1952, was extended almost another 1,000 ft. with a Precambrian test to 8,613 at the Humble 1 Weaber-Horn unit. This abandoned well is in 28-8n-3e, Fayette County.

Amerada Petroleum Corp. bettered its own 1957 record in Montana. The old depth record of 14,-828 ft. was extended to 15,135 ft. by the 1 Antelope in 1-152n-95w, McKenzie County. The firm completed this test as an oil producer.

In the sectional new-record depths, Texas led the pack with three. These occurred in South Texas, Texas Gulf Coast, and North Texas. In Webb County, South Texas, H. L. Hunt 1 Walker drilled to 20,603 ft. in the Glen Rose section before abandoning the hole. Old depth for this area was 19,503 ft. dug in 1958. In De Witt County of the Texas Gulf Coast, Shell 1 Carroll completed a 19,765-ft. oil well after reaching the Edwards. This was 703 ft. deeper than the old mark drilled in 1955 in Jackson County. In North Texas, a Grayson County venture went to 18,008 ft.

We'll stand on our heads to give you a good deal . . .



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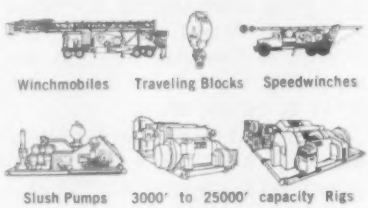


Winchmobiles Traveling Blocks Speedwinches

Slush Pumps 3000' to 25000' capacity Rigs

"Low maintenance cost sold us on Edward Mudwonder Valves,"

says Jess L. Warton,
Warton Drilling Co.,
Odessa, Texas

"Everybody knows that drilling contracting can be a tough business. And, those of us who make a living at it would be the first to say so. Yet, the difference between success and failure is often a very subtle matter.

"In my experience, making a go of it hinges largely on having plenty of know-how and experience in drilling, plus first-class rigs and other equipment, plus well-trained crews and tool pushers. Men and equipment have to be tops, and they must also work well together.

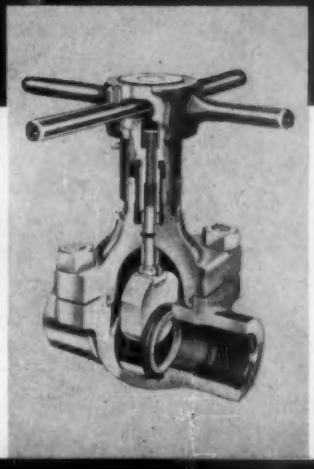
"For example, a successful drilling contractor has to be especially careful about selecting engines, pumps, valves, drill bits and other operating gear. The difference between best and next-to-best is the difference between a profit and no profit. Mud valves are a case in point.

"We found that Edward Mudwonders required less maintenance than the others. We now follow a program of switching to Mudwonders whenever other mud valves wear out and require more and more maintenance."

For additional information on Edward Mudwonder valves, see your favorite oil field supply store, or write Edward Valves, Inc., 1212 W. 145th Street, East Chicago, Indiana. Subsidiary of Rockwell Manufacturing Company.

EDWARD STEEL VALVES
another fine product by
ROCKWELL

Jess L. Warton, Owner, Warton Drilling Company, shown at Rig #3 on lease near Andrews, Texas.



Mudwonder cut-away view shows the one-piece seat insert with Buna-N molded integrally over steel wear rings; chrome gate with "T" slot connection; separated stainless stem and double thread construction.

new Dowell acidizing aid boosts production–improves success ratios

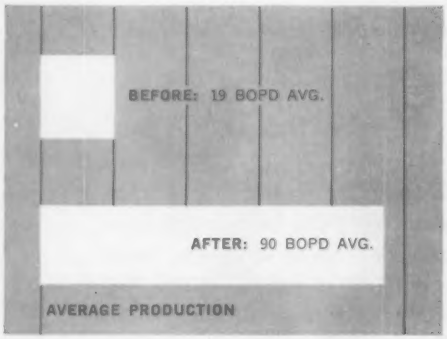
Slugs of gelled water injected between batches of acid are effective temporary plugs when acidizing long pay sections. Here are results from 21 wells.

Operators in many areas have found that Dowell water gels provide an economical temporary plug for use in the selective acidizing of long pay sections. These gels contain a breaking agent which causes the gelled water to revert to a thin liquid, primarily by hydrolysis. Breakdown time varies with gel concentration, the presence of acid, and temperature. Overall treatment cost to the operator is often unusually low for the production improvement realized.

As an example, 21 oil wells in the delta area of South Louisiana were acidized using slugs of water gel between stages of acid. Production was from a series of dirty, poorly consolidated Miocene sands interbedded with silt, clay and mudstone. Depths of these wells ranged from 6400 to 11,000 feet. Here is a tabulation of results from all 21 wells:

WELL NUMBER	LOCATION	PRODUCTION BEFORE TREATMENT, BOPD	PRODUCTION AFTER TREATMENT, BOPD
1	WEST DELTA	8	8
2	WEST DELTA	63	312
3	WEST DELTA	0	17
4	WEST DELTA	41	144
5	WEST DELTA	30	216
6	WEST DELTA	42	140
7	WEST DELTA	0	223
8	WEST DELTA	35	108
9	WEST DELTA	60	203
10	WEST DELTA	0	30
11	WEST DELTA	20	22
12	WEST DELTA	24	24
13	WEST DELTA	7	35
14	DELTA FARMS	0	0
15	DELTA FARMS	0	300
16	STELLA	0	20
17	GRAND BAY	0	0
18	EAST BAY	22	35
19	EAST BAY	17	25
20	EAST BAY	3	0
21	MAIN PASS	26	32

Length of perforated intervals treated ranged up to 50 feet. Some treatments used as many as four stages of acid separated by three water gel slugs. Quantities and number of stages were engineered to meet well conditions.



Out of the 21 treatments, 15 showed a definite improvement. The success ratio of 71.5 per cent and the average production increase of 370 per cent were both considered excellent.

As shown above, this water gel, made from water and a Dowell addition agent, is free of solids. It serves well as a temporary plug, yet it thins readily. Viscosity can be tailored to suit well conditions.

When you consider acidizing a long pay section, check with your Dowell representative about water gel slugs. These gels have been used successfully in many areas. Dowell services and products are offered from more than 150 offices and stations in the United States, Canada, Venezuela, Argentina, Germany, France and the Sahara area. Dowell, Tulsa 1, Oklahoma.

SERVICES FOR THE OIL INDUSTRY

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A FIVE-WELL strat-test program in Sheboygan County, Wisconsin, recently concluded, failed to find suitable traps for oil or gas. Texas-Wisconsin Exploration Co., Houston, conducted the 2-month search.

Wildcat efforts fail to hit pay dirt in Badger State

BY FRANK J. GARDNER

ONE OF THE most unusual exploration programs of recent months has taken place in, of all places . . . Wisconsin. While it was fruitless, it should not go ignored by the industry, for had it paid off, 95% of the exploration managers in this country would have been caught with their maps down.

This was a legitimate campaign, conducted by professional geologists of good repute and headed by one of the most respected names in the business. And it's the sort of imagineering we need if U. S. oil hunting is ever to get off dead center.

Texas-Wisconsin Exploration Co., sponsor of the project, is headed by Ralph E. Davis of Houston. Geologist G. L. Knight. Amarillo consultant, is secretary and vice president, and was in active charge of the drilling operation. Geologist G. E. Hatton, another Amarillo consultant, also assisted in the hunt.

Anything was welcome . . . Texas-Wisconsin based its work on gravity surveys of the western shore of Lake Michigan in Sheboygan County, Wisconsin. Using a rotary rig belonging to Sitton Drilling Co. of Evansville., Ind., the operator drilled five stratigraphic tests during last November and December, in an effort to find some kind of structural expression suitable for an oil or gas trap.

"We were after oil, gas, or even a storage prospect . . . anything we might have found would have been O. K.," Knight explained.

Four of the holes were sunk to an average depth of 700 ft., and one to 1,500 ft. But on finishing the fifth, and meeting only with discouragement, Texas-Wisconsin pulled out and suspended operations on January 9. There's a chance it will go back in the spring for a second look.

This was not the first time oil-hunters had invaded Sheboygan County. Back in 1949, Wisconsin Oil & Refining Co. sank a cable-tool test near Gibbsville to 4,420 ft. in granite. The samples, records, and log of this well, the 1 Jensema, were preserved by the Wisconsin Geological Survey, and served as a guide to Knight and Hatton as their work progressed.

Texas-Wisconsin signed up 32,000 acres of leases in the area of Cedar Grove, Gibbsville, and Oostburg, south and west of Sheboygan, and across the lake from the producing fields of Michigan. The acreage was inked at $1.00 per acre and a provision for $500 to be paid the farmer for each drill site.

At a center of curiosity . . . The first test went down on the Henry Teunissen farm, southwest of Cedar Grove. It became a local tourist attraction overnight. Wisconsinites are not exactly accustomed to seeing 127-ft. oil derricks on their landscape.

"At first," said the Milwaukee Journal in a story about the well, "as many as 25 to 30 cars paused along Highway 144 . . . so many spectators turned up that workmen feared for their safety." As the novelty wore off, and no gushers appeared, the first excitement subsided, however. "We did have to ask them several times, though, to move their cars so we could move the rig," Knight said.

What are the actual chances for oil in Wisconsin? Not too good, according to most oil hunters. "The chances of finding oil or gas are very slim, in my opinion," says State Geologist G. F. Hanson. "However, suitable structures for the underground storage of gas may be present."

Hanson points out that the bedrock in this area is Niagara-Silurian dolomite, overlain by glacial drift. The dolomite is about 600 ft. thick and is underlain by Maquoketa-Ordovician dolomitic shale, which is about 200 ft. thick and could serve as a trap barrier. Beneath the Maquoketa is about 1.000 ft. of Ordovician and Cambrian sandstones and dolomites, resting on the Precambrian crystalline rocks.

So the sediments are there. Structures . . . who knows? As so many before them have done, Texas-Wisconsin just drilled in the wrong place. Hats off to them, though, for a good try!

THE ISLAND OF JAMAICA is shown in relation to North, South, and Central America (Fig. 1). Note that Cretaceous rocks rest on igneous and metamorphic rocks in the generalized stratigraphic section of Jamaica at the right. Fig. 2.

TABLE 1–Generalized Stratigraphic Section of Jamacia

Quaternary		Alluvium, beach sands and recent reefs	
Late Tertiary		Coastal Formation and Upper Miocene (Pliocene?)	
Middle and Lower Tertiary		White Limestone Formation (Middle Eocene to Lower Miocene) Yellow Limestone Formation (Middle Eocene) Richmond shales (Lower Eocene) Wagwater Conglomerate (Lower Eocene)	
CRETACEOUS	Maestrichtian	Sunderland Inlier	St. Ann's Great River Inl.
		Garlands-Mocho Series, red congl. and shale Vaughansfield Series, 100 feet, two lm. separated by clay Popkin Series, 300-600 ft., Congl. and shale Maldon Series, 240-370 ft., two lm. separated by clay Woodland Series, 325-485 ft., shale. Calton Hill Series, 180 ft., shale and lm. Shepherds Hall, 2,800 ft., tuffs and congl.	
	Campanian	Stapleton Series, 125 ft., shale and 2 lm. Newman Hall Series, 2,000 ft., dark green mudstones Sunderland Series, 2,000 ft., shale and volcanic sandstone Johns Hall Series, 500 ft., congl. and tuffs	Shale, with congl. and sandstone in upper part, 1,200 ft.
	Santonian		Barrettia lm., 15 ft.
	Coniacian Turonian		"Inoceramus shales" with congl. and sandstone, chiefly in upper third, 2,800 ft.
Igneous and Metamorphic Rocks		Newcastle Porphyry (Middle-Lower Eocene) Nutfield Volcanics (Lower Eocene?) Granodiorite (End of Cretaceous) Hornfels and Metamorphosed Cretaceous beds Andesite dikes and other intrusions in Cretaceous beds.	

Jamaica exploration to be unhurried, thorough

GEORGE R. WOOD
Englewood, Colo.

THE ISLAND of Jamaica is self-governed within the British Commonwealth. This island is 508 air miles or 2½ flying hours southeast of Miami, Fla. See Fig. 1.

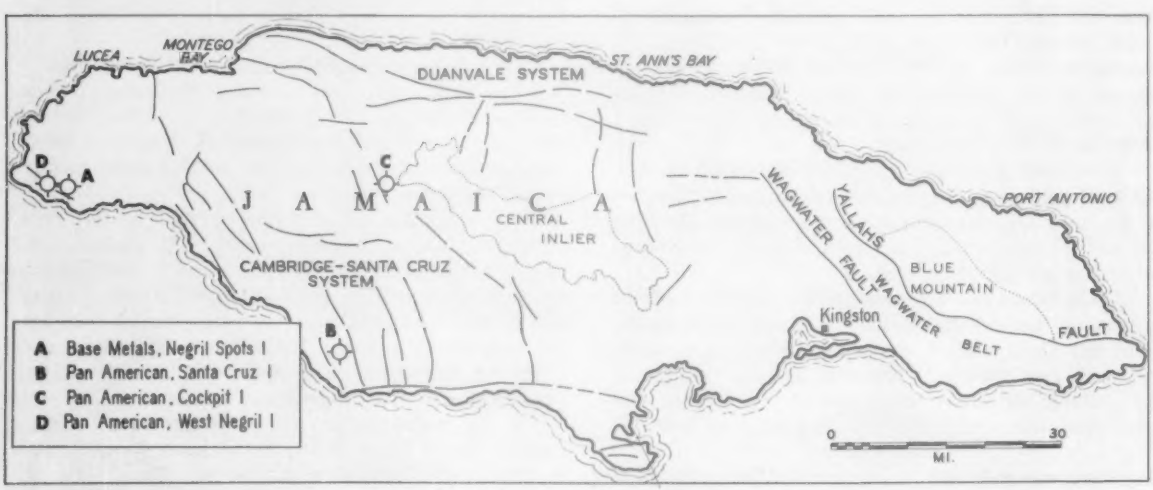
Jamaica is one of the oldest settled parts of the New World. It was discovered by Columbus on his second voyage in 1494. Shortly thereafter, it was settled by the Spaniards and remained under their rule until the British captured the island in 1655.

At one time it was one of the richest of Great Britain's colonies.

The discoverer of the island and the pirates who followed searched the area for gold but not until the middle of the twentieth century was there any consideration given to oil being found on the island.

Stable politics. Due to the unstable political conditions in various South and Central American countries, exploration for oil and gas has shifted to countries with stable governments. One of these is the Island of Jamaica and its offshore cays and bank. Since 1949, Jamaica has had an active geological survey under the direction of Prof. V. A. Zans. The survey, during the past 10 years, has had 10 men working and has uncovered stratigraphic information not generally known to the oil and gas companies. By means of paleontology, Dr. L. J. Chubb has been able to do considerable work in correlation and thickness of the Cretaceous. The work of the geological survey is published in annual reports and by the local society in a publication called "Geonotes". Nei-

Presented at RMAG Meeting, 1960.



A CLOSEUP VIEW OF JAMAICA shows major structural features and the four wildcats drilled on the island. Fig. 3.

ther of these publications has a wide distribution among geologists.

Little attention. In years past, Jamaica has received little attention for possible petroleum production because it was believed to be covered with relatively thin sections of Tertiary and Cretaceous rocks which are largely volcanic in origin and these, in turn, have been intruded by dikes and sills. This has been proved in the southwestern part of the island where four wells were drilled.

Oil men now believe that these four wells do not condemn the remainder of the island and especially the northern coastal zone and the eastern third of the island where thick Cretaceous sections are exposed. A well-known gas seep is there. With this in view, along with the petroleum policy of the Jamaican government, the attractiveness of the island is further enhanced.

Stratigraphy of Jamaica . . .

The late Tertiary formations are variable and found in irregular areas along the fringe of the island.

The Middle and Lower Tertiary formations cover most of the surface area of the island. The White limestone and Yellow limestone formations range in age from Middle to Lower Miocene. The former limestone formation, being the youngest in age, has a lateral surface extent of at least two thirds of the island. The Yellow limestone occupies a much smaller surface area. Generally these two limestone formations appear lithologically alike as the color change is not always predominant. Therefore, the micropaleontologist is the only one who can divide the two formations.

The thicknesses of the two limestone formations are variable. Karst topography is a feature of these limestone formations.

An area northwest of the Central inlier called the "Cockpit Country" has reached an advanced stage of karst development. This area is uninhabited and no roads traverse it due to the hard rugged terrain. Rain water caused the intense solution of the limestone forming the karst topography and large caves and conduits. Therefore, seismic work is very unreliable on these limestone formations. The Yellow limestone does not occur in the eastern third of the island, probably due to nondeposition. However, it's a problem yet to be solved.

The Richmond shale of Lower Eocene age was called the "Carbonaceous shales" by the early geologists. The Richmond shales are found in the eastern one-third of the island; that is, east of the Wagwater fault. The Jamaican Geological Survey has not found any Richmond shales west of this fault. There are Carbonaceous shales of Cretaceous age found north and west of the Central inlier. It is no wonder the early geologists called all these shales the same, or "Carbonaceous shales" for lithologically they appear alike; though they are of a different age. A thorough study of the Richmond shales by micropaleontology would probably solve its relationship with the overlying limestone formations.

The Wagwater conglomerate at the base of the Tertiary marks the unconformity between this and the underlying Cretaceous.

Outcrops of Cretaceous rocks are found in isolated areas, predominantly in the northern half of the island in the form of inliers, and on the flanks of the Blue Mountains. From west to east they are as follows: Lucea inlier, a short distance southwest of Montego Bay; Sunderland inlier, between Montego Bay and the Central inlier; St. Ann's Great River inlier, found a short distance south of St. Ann's Bay on the north coast; and Guy's Hill inlier, located between St. Ann's Bay and the eastern end of the Central inlier. Of course, Cretaceous rocks are found in the Central inlier, which is anticlinal and the backbone of the island.

Table 1 is the stratigraphic section compiled from later publications of the Jamaican Geological Survey. During the last few years, considerable progress has been made in the study of the separated Cretaceous inliers. More field work and micropaleontological study of the foraminifera of the formations will no doubt shed more light on the interpretation and age of this Cretaceous section. As has been proven only recently by micropaleontology, the Cretaceous rocks in the St. Ann's Great River inlier are older than those of the Sunderland inlier. It is now postulated that the Cretaceous on the flanks of Blue Mountain may be the oldest Cretaceous on the island.

The Jamaican Geological Survey is, at present, concentrating its work on the eastern third of the island. The reason this part of the island has remained until now to be explored geologically is its inaccessibility due to the rugged terrain and high relief, and because of the heavy rain - forest jungle caused by the tradewinds dropping their moisture in this mountainous area. Nevertheless, it is believed a good deal of Cretaceous stratigraphy as well as unknown structure will be found in this area.

The lithological character of the Cretaceous rocks found in the inliers along the north coast appear more attractive to the oil finder than those exposed in the Central inlier.

Structure of Jamaica . . .

The longitudinal axis of Jamaica is approximately N 70° W. The Blue Mountains and the Central inlier, which are the backbone of the island, have more or less the same structural trend. Figure 2 shows the principal structural feature and trends and the four drilled locations. They are south and west of the Central inlier. The Blue Mountains, with an elevation of 7,400 ft., were raised and overthrusted along the Yallahs fault zone in Middle-late Mioene time. The structural trends of N 70° W, or about parallel to the north coast, are the result of the Greater Antillean movement. Features in this trend are the Duanvale system, Central inlier and the Blue Mountains and also faults paralleling the south coast. Structural trends of N. 10°-25° W. are secondary and illustrated by the Cambridge-Santa Cruz system, Wagwater and Yallahs faults and numerous faults in between.

The Duanvale fault system paralleling the north coast and possibly tying in with the Bartlett trough which separates Jamaica from Cuba,

is a complex system of faulting and anticlinal trends. One of these anticlines is a short distance south of St. Ann's Bay and in the St. Ann's Great River Cretaceous inlier. This structure is faulted and a well-known gas seep occurs on the north flank. The gas from this seep has been analyzed as 98% methane. This structural feature has never been drilled.

The Wagwater fault zone is important, for along its projection in Upper Cretaceous time there existed a boundary between two faunal provinces. The western two-thirds of the island may correlate with the Cretaceous rocks of Venezuela or Colombia, while the eastern one-third of the island correlates more closely with the Cretaceous rocks in Cuba. A Cretaceous section in need of further study is that found in the Rio Grande Valley, south of Port Antonio. It is here that Dr. Chubb believes the oldest Cretaceous in Jamaica will be found. Some Jurassic might also be found in this locality.

There are many anticlines and structural traps, all of which more or less parallel the main structural feature. None of these features on the north and east side of the island has been tested and it is here stratigraphic conditions appear most favorable for the production of oil or gas.

Previous exploration . . .

In 1955 Base Metals Mining Corp., Toronto, Canada, drilled 1 Negril Spots to total depth of 6,314 ft. A Brown dolomite section, 2,450-3,460 ft. in depth had oil saturation and oil staining in the samples. The age of this section is believed to be Early to Middle Eocene. This test well was completed as a dry hole in June 1955.

In January 1956, Pan American Oil Co. took over from Base Metals and did extensive surface, seismic, and aeromagnetic surveys. Foreign exploration is often done in such a hurry that much money and human effort is wasted for lack of coordination between different exploration units. Pan American drilled three deep tests in the southwestern part of the island. (See Fig. 2). Seismic work on which these tests were in part located is useless, because of the nature and character of the limestone from which the records were obtained.

The Santa Cruz structure, upon which the first Pan American well was drilled, is a large anticline 14 miles long north and south with an estimated 2,000 ft. of closure. It is asymmetrical with its steep flank on the west and also faulted on the west. This location was drilled to a total depth of 8,732 ft. The White and Yellow limestones were found to be four to five times thicker than expected. Lower Tertiary and Upper Cretaceous were absent. However, 1,459 ft. of Cretaceous was found to overlie the basement metamorphics at 7,910 ft. This well was temporarily shut down for months because the drilling equipment was too light for testing. Consequently, reported shows and staining were mudded off after setting for months and the test was completed as a dry hole.

The second endeavor of Pan American was its 1 Cockpit located just off the northwest end of the Central inlier. The section drilled was similar to that of the Central inlier as one would normally expect. There were two drill-stem tests taken and porosity noted in the Logie Green member of the Cretaceous. The test was abandoned at a depth of 5,525 ft. in volcanics and lava flows.

The third and final test by Pan American was spudded on June 10, 1957, on what is called the West Negril structure. This is 3 miles west of the 1 Negril Spots drilled in 1955 by Base Metals. There are some important differences between these two wells. For instance, the Yellow limestone thickened from 300 ft. in the Base Metals well to 1,800 ft. in the Pan American well. The Masemure formation of Cretaceous age lengthened from 1,450 ft. in the Base Metals well to over 5,000 ft. in the Pan American well. The porous brown dolomite section at 2,435 ft. in the Base Metals well was missing in the Pan American well. Structurally, the Pan American well is much lower and there is a fault separating the two locations.

Some conclusions can be drawn from the above exploration work. It is believed the island of Jamaica is tilted to the south, because the great thickness of Tertiary limestones found in the Santa Cruz well drilled by Pan American. Thus, as subsidence took place, there was limestone deposition at the same rate thus giving the abnormal thickness of Tertiary limestones.

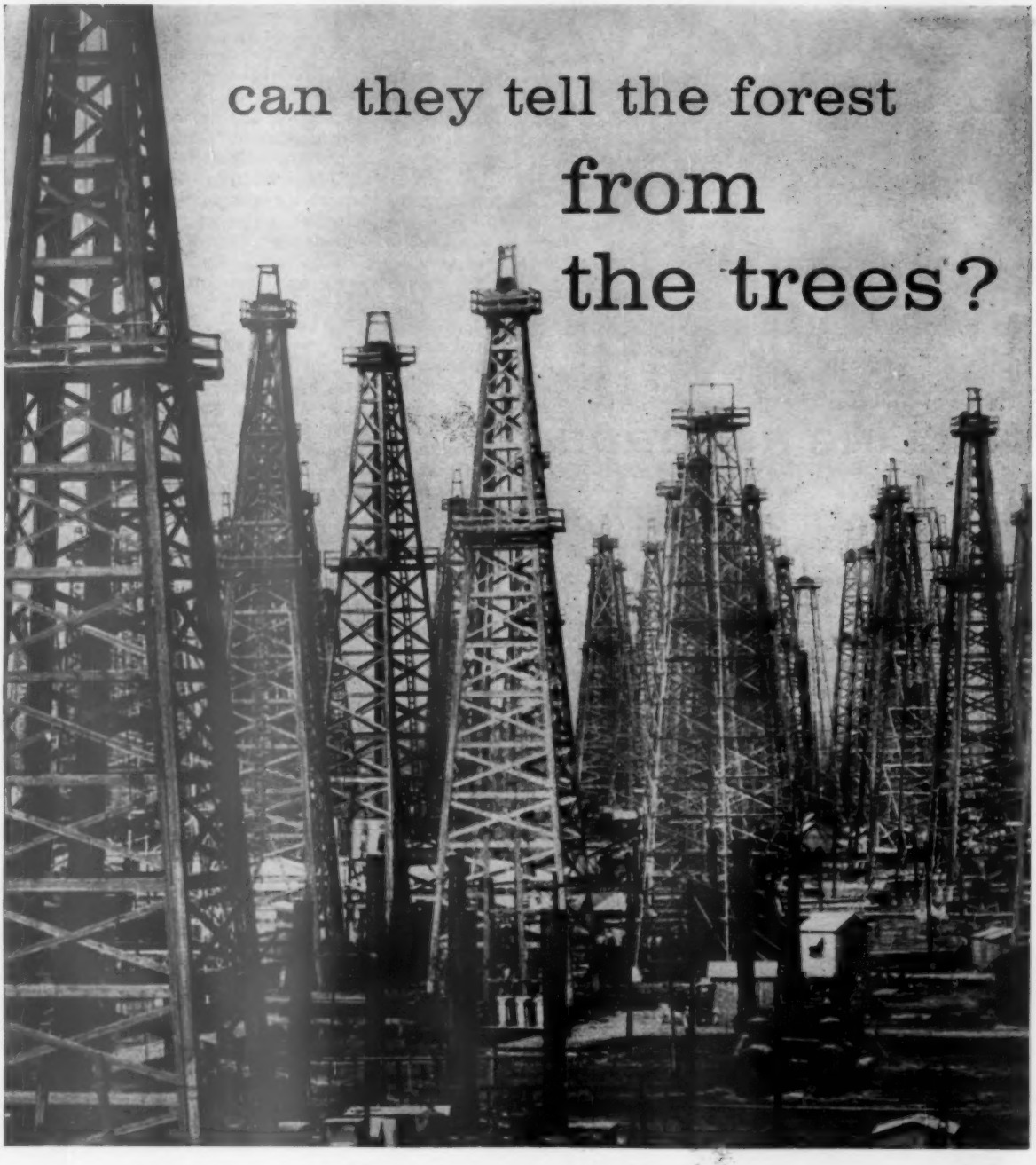
If the theory of the island being tilted to the south is correct, it is believed that hydrocarbones would migrate to the updip side of the island or along the north coast. The gas seep previously mentioned could be an indication of this theory of tilting.

The other three locations are believed to have been located too close to the backbone of the island and for this reason did not penetrate the favorable Cretaceous section of some 12,000 ft. worked out by Dr. L. J. Chubb and the Jamaican Geological Survey in the past few years. If the aeromagnetic work done by Pan American had been carried out to a higher derivative it would have helped them considerably in analyzing the relationship between surface and subsurface structures.

Thus, previous exploration work of oil companies on the western quarter of the island should not condemn the remaining three-quarters of the island, where it is known good Cretaceous section occurs.

Future exploration . . .

On September 22, 1959, Jamaica Time Petroleum, Inc., headed by R. R. Greenbaum, Wichita, signed an agreement with the Jamaican government for an exclusive exploration concession covering all of Jamaica and its territorial water which includes the Pedro bank and the Morant cays. The terms of the agreement allow 18 months for a thorough geological and geophysical exploration program preceding any drilling. All of the previous exploration information is available such as maps, reports, well samples, electric logs, and geophysical surveys. This could all be integrated into a thorough study before drilling; doing away with the "hurried-up, crash, bang" programs that are so common



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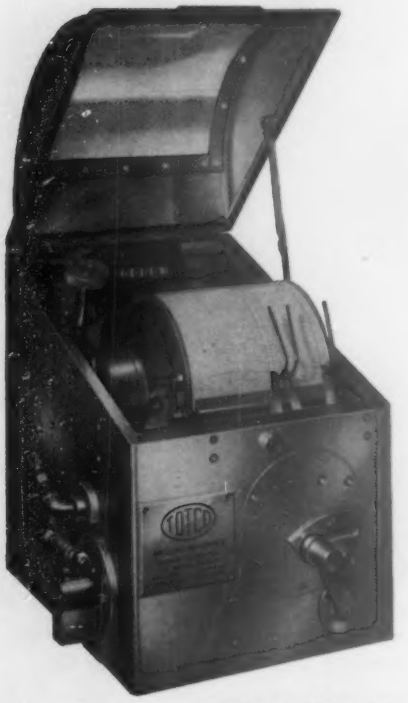

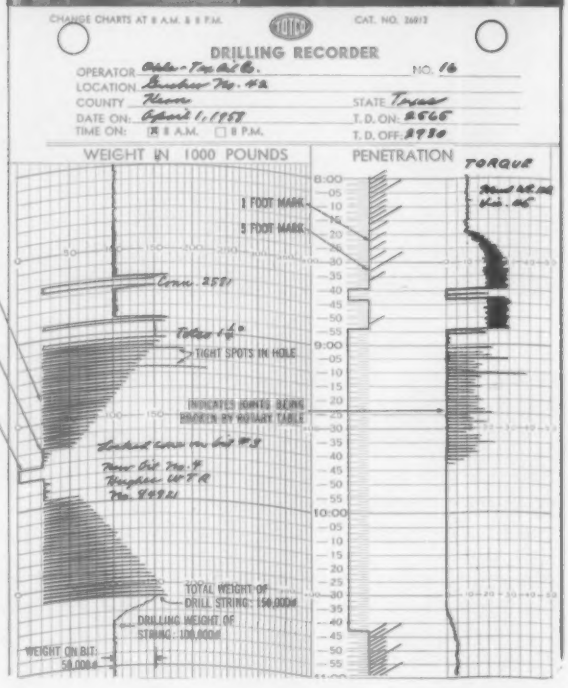

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At the end of the exploration period the agreement calls for the first of a series of five wells to be started. One test must be drilled to 15,000 ft. if possible; however, there is a "hard-rock" clause in the agreement.

Royalty is 16⅔%; mineral leases given will be for 20 years, with right of renewal for another 20 years; no rentals are payable for the first 5 years after the acreage is chosen and thereafter the rentals are nominal.

Acreage is earned on a graduated scale, with wells drilled below 1,000 ft. earning 40,000 acres and those going over 12,000 ft. acquiring 80,000 acres. In case oil is discovered above 1,000 ft., this well earns 40,000 acres. A Canadian checkerboard system is provided except the retained units are larger. Any disputes that may arise are to be settled by impartial arbitration.

Lisbon gets third producing formation

Utah's Lisbon field gained its third producing zone, the Pennsylvanian Paradox Salt.

Pure Oil Co. completed 2 U.S.A.-C in NE NW 3-30s-24e, San Juan County, flowing 103 bbl. of oil and 129 M.c.f.d. through 16/64-in. choke. Production is from perforations at 6,050-65 ft. in the Paradox Salt. Gas-oil ratio is 1,252:1. There were no good shows in the regular field pays, Mississippian and Devonian. Location is 1 mile north of the field discovery Devonian well.

San Juan basin. A three-pay well was completed at Otero in northwestern New Mexico's Rio Arriba County.

Continental Oil Co. 9 1 Haynes in NW SW 9-24n-5w, pumped 10 bbl. per day from Greenhorn perforations at 6,522-94 ft. This is the first such oil in the field. A Greenhorn well was finaled in 1960 in the eastern part of the basin at Puerto Chiquito field, opened by Intex Oil Co. The Continental well also flowed 920 M.c.f., and 20 bbl. of condensate per day from the Dakota Cretaceous through perforations at 6,726-48 ft. Gallup got 40 bbl. per day from perforations at 5,760-5,818 ft.

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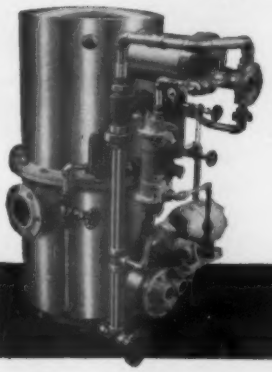

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In East Texas

Jurassic wildcatting may break '60 records

EAST TEXAS' booming Jurassic drilling play will get even hotter this year.

R. W. Eaton, Tyler, Tex., consulting geologist, told Dallas area geologists recently that Smackover and Cotton Valley wildcatting will increase notably in 1961 over 1960's record-high pace.

Speaking at a Dallas Geological Society luncheon, Eaton termed the deep Jurassic beds as "East Texas' last great frontier as far as petroleum reserves are concerned."

And, despite the heavy drilling costs, the deep play is proving profitable.

Last year, Eaton reported, operators drilled 18 Jurassic tests in East Texas, resulting in five Smackover and three Cotton Valley discoveries. "This discovery ratio is almost unheard of in East Texas since the 1920's."

The Tyler geologist said operators now are drilling more than a dozen Jurassic wildcats which will cost an aggregate of about $2,450,000.

He estimated, however, that the industry is already in the black in reserves established in the past 5 years, despite a total investment of more than $150,000,000 in Smackover exploration in the last 20 years.

Importance of East Texas' Jurassic beds was hammered home in 1954 with Tidewater Oil Co.'s discovery of New Hope field in Franklin County.

"From 1955 to 1957, field development there proved a major reserve of gas rich in sulfur and condensate content—and with a gross value of more than $500,000,000."

Recently, Shell Oil Co. and Pan American Petroleum Corp. have chalked up Smackover gas-condensate strikes in northern Cass and northwestern Wood counties which appear to have significant reserves, he said.

Big area for hunt. Eaton said past drilling indicates Jurassic potential is highest in the area stretching southwest from Bowie County, through Cass, Morris, Franklin, Titus, Hopkins, Van Zandt, and possibly parts of Henderson and Navarro counties.

The prospects for finding new Smackover oil and gas reserves are reasonably good throughout all or portions of 17 East Texas counties, Eaton said. This area takes in more than 8,100 sq. miles.

West Texas field confirmed in Yoakum

The second producer and confirmation well to newly opened Wasson-Wichita Albany and East Wasson-Wolfcamp Permian field in Yoakum County, 2 miles northwest of Denver City in West Texas, is Cornell Oil Co. 62-C Whittenburg Estate.

The well pumped 195 bbl. of 37.8°-gravity oil per day plus 15% water from Wolfcamp perforations at 8,672-82 ft. From Wichita Albany perforations at 8,368-8,500 ft., the well pumped 228 bbl. of 40.1°-gravity oil daily. Location of the dual well is in Section 863, Block D., John H. Gibson Survey.

Garza County. Pennsylvanian production is indicated at a 9,000-ft. wildcat in central Garza County, 4 miles southeast of Post.

Shell Oil Co. 1 W. M. Kirkpatrick flowed 11 bbl. of 29.7°-gravity oil in 155 minutes through ¼-in. top choke and reversed out 49 bbl. of oil plus 1 bbl. salt water during drill-stem test at 7,900-21 ft., open 233 minutes. Gas surfaced in 6 minutes, mud in 72 minutes, and oil in 74 minutes. Location is in Section 3, Block 2, GH&H Survey, 1½ miles south of Garza field and 4½ miles northeast of North Teas field.

Crockett County. Eason & Hancock of Big Spring completed 1 University Block 46 in northeastern Crockett County, 24 miles southeast of Big Lake. The well pumped 26 bbl. of 34°-gravity oil per day through Permian perforations at 1,646-88 ft. The 1-B University Block 46 will be drilled ½ mile southwest of the discovery. The field opener is in Section 13, Block 46, University Lands Survey.

Southeast New Mexico. G. W. Strake 2 Union, northwest offset to the 1 Union Yates sand discovery in eastern Eddy County, 23 miles northeast of Carlsbad, was completed flowing 173 bbl. of oil per day. The discovery well of the field pumped 76 bbl. of oil per day. Pay in the second well and field confirmation was at 1,767-98 ft. Location is 2 miles west of production in West Lusk field in 23-19s-30e.

Caddo pay opened in West Central Texas

A dual producer and Caddo pay discovery in Northeast Gem Mississippian field, 7 miles northwest of Albany in northeastern Shackelford County, Texas, was completed by Four J Cattle Co. et al. The 1 Walker Estate flowed 404 bbl. of oil per day through 16/64-in. choke at 3,960-70 ft. in the Caddo. From Mississipipan perforations at 4,540-84 ft. the well flowed 167 bbl. of oil in 8 hours through same choke. Location is 1 location southeast of Gulf Oil Corp. 1 Walker-Buckler Trust, the discovery well for the new area. The dual success above is location in Section 383, TE&L Survey.

Archer County. Tom C. Ferguson completed 1 Garvey in southeastern Archer County, North Texas, flowing 583 bbl. of oil per day through 12/64-in. choke from perforations at 5,320-40 ft. in the Mississippian.

Ferguson Mississippian field is located 10 miles southeast of Archer City in the Joseph Levins Survey, A-260. It lies 1 mile northwest of L-G Mississippian field.

Castile producer finaled in Reeves County, Texas

The second Castile producer in Worsham field, northern Reeves County, West Texas, is Texas Crude Oil Co. 1-2 Gilmore, 12 miles east of Pecos.

The well flowed 368 bbl. of 26.3°-gravity oil daily through

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24/64-in. choke from perforations at 2,771-87 ft. Location is in Section 2, Block 7, H&GN Survey.

Gas deliveries start from West Virginia field

Natural-gas deliveries from Paint Creek field of United Producing Co., Inc., in Kanawha and Fayette counties, West Virginia, were started just before the year-end, with sales averaging 18,400 M.c.f.d. of gas.

Contract price for gas is 28½ cents per thousand cubic feet, company officials said. United Producing is a subsidiary of United Carbon Co. of Houston.

The deliveries, made to Amere Gas Utilities Co., represent the first production from Paint Creek field, discovered 2½ years ago.

United has a 69,000-acre block under lease, with 16,000 contiguous acres dedicated to Amere.

Nineteen producing wells have been drilled on the property and others are presently being completed. United will continue drilling until the productive limits of the field have been established.

United constructed 18 miles of pipeline and gathering system and Amere, a subsidiary of United Fuel Gas Co., laid 16 miles of pipeline in the rugged mountain country to permit delivery of the gas.

Colorado's Egnar unit discovery completed

An important gas discovery southwest of East Lisbon field in San Miguel County, southwestern Colorado, was completed flowing 11,700 M.c.f.d. The well is Belco Petroleum Co. 1 Egnar unit, 3-mile-southwest extension to Mississippian gas production at East Lisbon field.

Condensate flow at the well was not figured. Production is from a series of perforations between 9,116-9,296 ft. in the Mississippian. A 1½-mile-southeast extension try, 2 Egnar, is drilling.

Lisbon. Pubco Petroleum 1-12 Lisbon Federal in Lisbon field, San Juan County, Utah, had a cumulative production up to December 1 last year of 40,318 bbl. and 118,310 M.M.c.f. The gas was flared. November's output was 25,002 bbl. Pure Oil Co.'s U.S.A. Lease at Lisbon has produced 81,559 bbl. and 124,351 M.M.c.f. Pure had three wells producing, one capable producer shut in, and two wells drilling at the time the figures were released.

Pubco's well was completed last October with flow of 1,288 bbl. per day and 2,863 M.c.f.d. on 42/64-in. choke.

Important Abo confirmation well completed in New Mexico

The second Abo reef discovery for Vacuum Edge field in Lea County, 20 miles northwest of Hobbs in Southeast New Mexico, was completed. Standard Oil Co. of Texas 3 Vacuum Edge unit confirms the new field, flowing 276 bbl. of 41.1°-gravity oil per day through 18/64-in. choke. Location is in Section 4-18s-35e.

Roosevelt County. Lone Star Producing Co. extended production in newly opened South Prairie field at 1-B Federal, 21-8s-36e. The well flowed 431 bbl. of 49.2°-gravity oil daily on ¼-in. choke from perforations at 9,693-9,713 ft. Location is 5 miles southeast of Milnesand.

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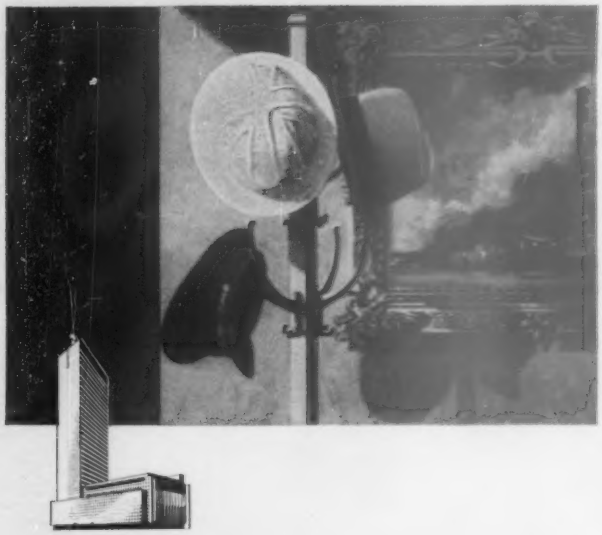

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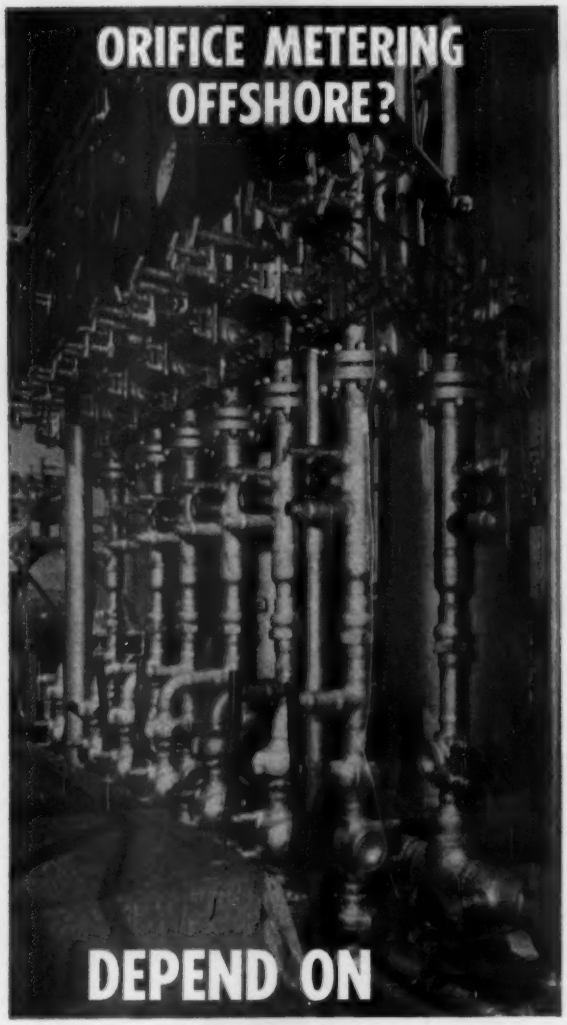

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Pat. Pend.

Oklahoma Panhandle gains another oil field

New oil production was established in Beaver County, Oklahoma Panhandle, at Russell Maguire 1-12 Blakemore in C SE NW 12-4n-22eCM, 1 mile northwest of Chester Mississippian gas production.

The well flowed 156 bbl. of oil in 6 hours through ½-in. choke from Marmaton Pennsylvanian at 5,522-5,666 ft. Well also flowed gas from the Chester. Location is the northwest offset to Harper Oil Co. et al. 1 Hayes, reworked wildcat in C NW 18-4n-23eCM. That well flowed gas from Morrow and Mississippian. The Hayes well has been included in Mocane-Laverne field by the nomenclature committee. The Blakemore well will be called Southeast Floris oil pool.

Texas County. Luke Grace Drilling Co. is testing at a new Morrow Pennsylvanian oil discovery in SW NE 7-3n-11eCM.

The 1 C. F. Webb, 5 miles southeast of Northwest Eva field, swabbed 7 bbl. of oil per hour on tests at 5,577-95 ft. Later swabbing netted 135 bbl. in 5 hours. This discovery opens South Eva field.

Cleveland County. Anderson-Prichard Oil Corp. will drill a confirmation well at its discovery on the old South Naval Base in Norman. The 2 Navy, SE NW SW 5-8n-2w, north offset to the new field opened earlier this month, will look for Bromide Ordovician production.

The field discovery well, 1 Navy in NE SW SW 5, flowed 27 bbl. of oil per hour during tests. Location is 1 mile south of the city of Norman limits.

Oklahoma's Kingfisher play continues to roll along

Another Manning Mississippian well was added to North Dover field in Oklahoma's Kingfisher County.

New producer is Humble Oil & Refining Co. 2 Barton in C NE NW 11-18n-7w. The well flowed 64 bbl. of oil in 4 hours through 24/64-in. choke from perforations at 6,917-64 ft. The fourth well also was added to Southwest Hennessey field by Humble at 1 Hixon in C NE SE 33-19n-7w. This offset flowed 160 bbl. of oil in 5 hours through 24/64-in. choke from Manning at 6,995-7,042 ft.

Oklahoma Natural Gas Co. dually completed 2 Patocka in C SW SE 14-19n-6w, East Hennessey field, flowing 34 bbl. per hour from Mississippi lime open hole at 6,687-6,812 ft. through 24/64-in. choke; from Manning perforations at 6,479-6,510 ft. the well flowed 37 bbl. per hour on 6-hour test from 20/64-in. choke. Shell 3 Davis, C SW SW 2-19n-6w, flowed 30 bbl. of oil per hour from Mississippi.

New field opened in Ness County, Kansas

HAIR FIELD, Ness County, Kansas, was officially opened at Colorado Oil & Gas Corp. 1 L. Hair, C NW NE 4-20s-24w, southwestern part of the state. The discovery well pumped 154 bbl. of 35°-gravity oil daily from perforations in the Mississippian at 4,401-2 ft. Location is 8 miles southwest of Ness City and 2½ miles northwest of Petersilie field.

Finney County. N. Appleman & Co. opened oil production at 2 Maune in C SW NW 31-21s-33w, 2½ miles southwest of Wampler field.

The well swabbed 6 bbl. of oil per hour for 6 hours from Mississippian St. Genevieve at 4,654-73 ft.

Saline County. Solar Oil Co. confirmed Maquoketa oil production in Dieter field. The 2 Dieter-MacDonald, NE NE SE 7-15s-2w, second well in the new field, pumped 100 bbl. of 37°-gravity oil per day, plus 65% water, from Maquoketa open hole at 3,232-37 ft. The discovery well, 1 Dieter, E½ SW NE 7-15s-2w, pumped 192 bbl. per day from open hole at 3,219-25 ft.

An extension well, 1 Clements in NW NE NE 7-15s-2w, is nearing completion ½ mile north. Swab got 36 bbl. of oil in 7 hours from open hole at 3,220-24 ft.

Marion County. Crowe Drilling Co., Inc., completed the second well in Dobbs field at 2 Kruse in C SW

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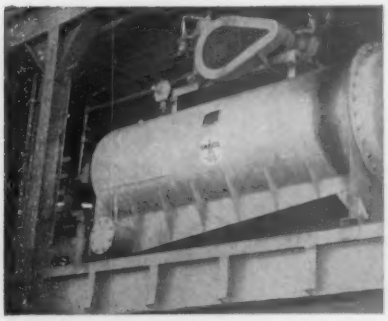

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SE 22-19s-3e. The well flowed 213 bbl. of 37°-gravity oil per day plus 10% water from Mississippian perforations at 2,438-45 ft.

A third well is also being proved in this field. Carey & Hollar have put up pump at 1 Schlotthauer in C SE SW 22-19s-3e. The well swabbed 5 bbl. of new oil per hour from perforations at 2,392-2,416 ft.

Kansas' Lane County gets new oil pay

A one-time producing county in western Kansas, Lane, is now back on the oil list. Petroleum Exploration Co. of Wichita 1 Leighton in C SW NE 28-16s-27w made up to 300 bbl. of oil per day on a drill-stem test in the Kansas City Pennsylvanian.

The test was at 4,179-4,237 ft. Recovery was 1,335 ft. of oil. Operator is now drilling at 4,575 ft. looking for the Mississippian. The county formerly had two producing wells that made 10,000 bbl. during their producing days, but now are abandoned. The oil revival in Lane County leaves only one county, Greeley, without oil or gas.

New Williston basin map available in Bismarck

Northwest Mapping Co., 117½ Fourth Street, Bismarck, N. D., has a newly revised map of northern North Dakota and southern Saskatchewan. The map is on a large scale, showing the individual fields and individual wells in the Williston basin area. The large scale and clear notation of all wells by section, township, and range, make this a valuable reference and working map.

Deep California test dry

The deepest well drilling in California has been abandoned as a dry hole.

Shell Oil Co. plugged its 1 Peterson in Section 32-5n-1e in Solano County at 15,001 ft. The well, drilled with a company rig, was spudded September 12. After setting 13⅜-in. surface casing to 830 ft., Shell took the well to 7,017 ft. and hung 9⅝-in. casing. Then the hole was cased to 11,605 ft. with 7 in.

The 1 Peterson is 2 miles southeast of the abandoned Denverton gas field and 1¾ miles northwest of Shell's 1 Unit A, a 1954 new-pool discovery for the North Kirby Hills gas field. The 1 Unit A, completed in an Eocene sand at 4,260-85 ft., was abandoned 3 years after its completion.

Triple producer finaled in Wise County, Texas

A triple-zone oil discovery 5½ miles northwest of Bridgeport in west-central Wise County, North Texas, was completed by Chester R. Upham et al. at 1 William Orr.

The well flowed 164 bbl. of oil daily through 16/64-in. choke. from perforations in Strawn Pennsylvanian at 4,513-4,601 ft. From Atoka Pennsylvanian conglomerate at 8,496-5,512 ft. the well flowed 148 bbl. of oil per day through 15/64-in. choke. From Atoka at 5,898-5,909 ft. it flowed 172 bbl. per day through 14/64-in. choke. Location is in the O. N. Metcalf Survey, A01234.

Hardeman County. Shell Oil Co.

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completed 5 C. G. Conely with oil in both Ellenburger and Mississippian. From Ellenburger it flowed 196 bbl. per day on 10/64-in. choke from perforations at 8,184-8,241 ft. From Mississippian at 7,838-84 ft. it made 160 bbl. per day. Location is in Conely Mississippian field, 8 miles west of Chilicothe in Hardeman County.

North Texas. Nearest Ellenburger production is 19 miles northeast in abandoned Fargo field, Wilbarger County.

Ellenburger oil may come to Texas field

Ellenburger Cambro-Ordovician oil is hinted at a wildcat in Conley Mississippian field in Hardeman County, Hardeman basin, North Texas.

Shell Oil Co. is testing at 1 Wilson, 8 miles west of Chillicothe, Tex. Drill-stem tests at 8,212-8,320 ft. got 550 ft. of gas in drill pipe, 120 ft. slightly oil and gas-cut mud. The well was completed earlier in a lower zone from Mississippian for 83 bbl. per day through 24/64-in. choke. This in itself was a new pay for the field. The Conley zone is the field pay. Operator plans to ask for discovery allowable for the new Mississippian pay.

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Minnelusa producer finaled at Raven Creek, Wyoming

The fifth Minnelusa producer was completed at Raven Creek field in Campbell County, northeastern Powder River basin, northeastern Wyoming. This new Pennsylvanian well is Kewanee Oil Co. 1 Pickrel in NE SE 14-48n-69w. Final gage was 712 bbl. of oil in 26 hours through perforations at 8,310-40 ft.

Mobil Oil Co. has a sixth well for the field in line at F-34-11-G, SW SE 11-48n-69w. It swabbed 30 bbl. of oil per hour for 3 days and recovered 630 bbl. of oil on the first 24-hour pump test. Perforations were at 8,308-17 and 8,326-28 ft. This one is a northeast offset to the Pennsylvanian discovery well in the field. Kewanee's well is the southeast extension to field production.

Kewanee 1 Federal-A in SW NE 11-48n-69w is also an apparent success, the seventh well in the field. It flowed 165 bbl. of oil in 4 hours from perforations at 8,232-68 ft. It lies on the northeast side of the field. Another well now coring is 1 Krause in C NE SE 11-48n-69w. Shell 41-14 Norman in NE NE 14-48n-69w is nearing total depth. Mobil is drilling below 7,730 ft. at F-12-11-P Krause in SW NW 11-48n-69w on the northwest side of the field.

Seven wildcats among thirteen new Michigan starts

Thirteen new starts were reported for Michigan the week ended January 21, including seven wildcats.

The wildcats included the first test for northeastern Michigan in months. Walahalla Oil Co. will drill the Wilson 1, SE SW SE 22-27n-9e, Alcona County. It is projected to only 2,700 ft. or the Richfield zone.

Hartman & McClure 1 Douglass, NW SE NE 15-4n-16e, St. Clair County wildcat 6 miles east of the Peters oil-gas reef, was still coring

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reef and gas pay at 2,484 ft. First gas was logged at 2,196 ft. Sun, Michigan Consolidated Gas, Humble, and Panhandle Eastern hold acreage in the play.

Whitehall Oil, Inc., who has drilled seven consecutive Humble farmout blocks the past 4 months, will test porosity zone in the Salina-Niagara series at the 1 Siersema, C SE NW 26-13n-14w, Newaygo County. Casing was cemented at 5,515 with Niagara section logged at 5,020 ft.

Northeast Ohio leads state exploration

Ohio's northeastern corner still keeps its lead over other Buckeye exploratory events. Monroe Township, Ashtabula County, has a new Oriskany sand gas discovery, made by James Drilling Corp. of Blairville, Pa.

The gasser came in with a natural open flow of 7,750 M.c.f.d. with a rock pressure of 850 psi. The Oriskany sand was hit at 2,041 ft. at the 1 Harpula in NW¼ Lot 21. On a 24-hour test, the well still made 6,800 M.c.f.d.

James Shearer, president of James Drilling Corp., was the discoverer of Shearer oil field in Bethlehem Township, Coshocton County in 1952, and also drilled the biggest oil well in Ohio in 1955 in Washington Township, Hocking County. Out of the last 44 wells drilled by this firm, only 7 have been dry holes.

Semiwildcat Ohio well shows production

In Ohio's Richland Township, Fairfield County, a semiwildcat, more than a mile from production, flowed 100 bbl. of oil with an estimated 1,500 M.c.f.d. of gas in a 24-hour test 2 weeks after fracture.

The operator, Edward J. Kobat, reported 1 William M. Binckley, Section 16, found the Clinton sand at 2,520-46 ft. with 4 bbl. and a show of gas natural.

A successful Clinton gasser has been completed by Roy Weed in the first attempt to establish production in Washington Township, Lawrence County, since 1947. This stepout, 1 Cambria Clay Products Co., Section 11, about ½ mile from production, found the Clinton sand at 2,947-60 ft. with a natural gage of 525 M.c.f.d. The well was water-fractured and gaged 2,500 M.c.f.d. with a rock pressure of 910 psi.

Weed has scheduled a followup southeast of this producer.

Louisiana gas well confirms new find

An offshore gas discovery made late in 1959 by The California Co. in Block 12, Main Pass Area, Louisiana, is just now being confirmed in a newly completed well drilled by Gulf Oil Corp.

Gulf's new well, 1 Louisiana State "QQ" 195, flowed dry gas at the rate of 3,080 M.c.f.d. while testing through 12/64-in. choke. Flowing pressure registered 3,850 psi. Pay is perforated at 10,066-72 ft.

Discovery well flowed 1,349 M.c.f.d. at 10,079-85.

The wells are just off the east coast of Plaquemines Parish in Breton Sound.

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Also available with conventional API pin.

CHEMICAL ANALYSIS

Carbon	Manganese	Silicon	Chromium	Molybdenum
.39/.46	.65/1.10	.20/.35	.75/1.20	.15/.25

TYPICAL PHYSICAL PROPERTIES

Yield psi	Ultimate psi	% Elong. 2"	% Red. Area	Brinell	Izod
105,000	127,000	22	55	255	70

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SUCKER RODS

STATEMENT OF CONDITION

At the close of business . . .

December 31, 1960

RESOURCES

Cash and Due from Banks	$108,345,593.40	
U. S. Government Securities	70,035,849.67	
Other Bonds and Warrants	12,654,934.78	$191,036,377.85
Loans and Discounts		110,221,166.08
Income Receivable Accrued		600,492.64
Stock in Federal Reserve Banks		420,000.00
Bank Premises		4,631,707.80
Customers' Liability Under Letters of Credit		487,554.00
		$307,397,298.37

LIABILITIES

Deposits		$283,014,876.51
Letters of Credit Outstanding		487,554.00
Income Collected, not earned		478,464.18
Reserve for Taxes, Interest, Etc.		1,270,673.84
Capital—Common	$5,750,000.00	
Surplus	8,250,000.00	
Undivided Profits and Reserves	8,145,729.84	22,145,729.84
		$307,397,298.37

NATIONAL BANK OF TULSA

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Dual completion revives Texas' Santa Maria field

A new dually completed well southeast of Mercedes in southeastern Hidalgo County, in Texas' Rio Grande Valley, is reviving the old Santa Maria field, and opening what may be a new pay zone.

The well, Northern Pump Co.'s 1 Gray Gas unit, is rated good for 8,200 M.c.f.d. of gas from sand at 8,964-56 ft., and 6,400 M.c.f.d. from a higher zone at 8,313-36 ft. Shut-in pressures are 3,743 psi. and 2,982 psi., respectively.

The shallower zone is in the Somnitz sand, productive in the field's only other well, Bright & Schiff's 1 Somnitz, completed late in 1959. Location is 3,000 ft. northwest of that well.

The lower zone, believed new for the field, is nearly 100 ft. deeper than the pay zone of the field's original discovery well, drilled in 1945. That well, LaGloria Corp.'s 1 South Mercedes unit, no longer is on production.

New Texas Gulf Coast well is quadruple producer

A new well in the Amelia field, southwest of Beaumont, in Jefferson County, Texas Gulf Coast, has been completed as a quadruple oil producer. Total potential flow of the four zones is 516 bbl. daily.

The new well is Humble Oil & Refining Co.'s 3-F Dishman. Completion is the "tubingless" type with each of the four zones producing through an individual string of 2⅞-in. tubing without a production string of casing in the hole.

The well flowed 93 bbl. daily through 9/64-in. choke from 6,322-24 ft.; 163 bbl. through ⅛-in. choke from 6,282-85 ft.; 154 bbl. through ⅛-in. choke from 5,587-90 ft.; and 106 bbl. through 9/64-in. choke from 5,280-82 ft.

Flowing pressures ranged from 225 to 725 psi.; gas-oil ratios from 245 to 273 cu. ft. per bbl.; and oil gravities from 27.4° to 29.3°.

Texas' Half Moon Reef field adds second Catahoula well

A north-edge well in the Half Moon Reef field in Aransas County, on Texas' central coast has been completed as the second well in the field's recently discovered Catahoula gas stringer sand.

It is Atlantic Refining Co.'s 4 State Tract 121, in Aransas Bay. The offshore location is the most northerly in the field.

The well is rated good for 5,092 M.c.f.d. of gas, making a small amount of 61°-gravity condensate. Shut-in pressure is 1,855 psi. Pay is at 5,634-40 ft. in hole drilled to 5,649 ft.

Gas well completed inside Aransas Pass city limits

A new gas discovery within the city limits of Aransas Pass in Texas' central coastal area, is reported by Mokeen Oil Co. and Sinclair Oil & Gas Co., joint operators.

Location, just inshore from Nueces Bay, is on the San Patricio County side of Aransas-San Patricio county line, which divides the city.

The discovery opens a new field south of the main part of old Aransas Pass field, and between it and Redfish Bay field, offshore in the bay waters.

Calculated open-flow potential of the well is 5,700 M.c.f.d. Pressure, shut-in, is 3,180 psi. Flowing pressures ranged from 2,215 psi. through 14/64-in. choke to 2,942 psi. through 9/64-in. choke. Gas has a trace of 38°-gravity oil. Pay is perforated at 8,362-78 ft.

New oil field opened in southern Mississippi

A new Lower Cretaceous oil field is being opened in South Mississippi.

Discovery well, drilled by Triad Oil & Gas Co. and Jett Drilling Co., Inc., is 4 miles southwest of Boykin Church field, in western Smith County, near the northeast corner of Simpson County.

Production is from the Rodessa formation, perforated at 11,069-82 ft. Extensive shows were logged in other Lower Cretaceous zones, particularly the Paluxy, but none has been tested.

Tested through 10/64-in. choke, the new well, 1 Dukes - Central, flowed at the rate of 127 bbl. daily. Flowing pressure registered 600 psi. Gas-oil ratio was 469 cu. ft. per bbl. Gravity of the oil is 38°.

Location is 4 miles north of Traxler, and 7 miles west of Raleigh. It is within a relatively small circle of deep Lower Cretaceous fields including not only Boykin Church, but also Raleigh and St. Martinville.

Discovery wells

ARKANSAS

Logan County:
J. M. Huber Corp. 1 Mabry, 6-8n-24w. 2¾ miles northwest of Scranton. IP 2,830 M.c.f.d., 1-in., CP 110 psi., perf. 6,745-74 ft., Orr sand, and 802 M.c.f.d., 1-in., TP 50 psi., perf. 7,013-52 ft., Woolsey and Hale sands. TD 7,920 ft. Discovery well of Scranton field.

Union County:
H. T. Pannell 4 T. D. Murphy, C NE SW SE 7-16s-15w. IP 80 BOPD, 10/64-in., 35°, TP 120 psi., GOR 100 cu. ft. per barrel, perf. 3,617-18 ft., Travis Peak. TD 4,237 ft. New pay in Smackover field.

ILLINOIS

Douglas County:
E. H. Hoffman 1 Spealman, NE NE NW 25-16n-7e. IP 4 BOPD, 15 BWPD. Rosiclare 1,698-1,705 ft. TD 1,706 ft. Opens South Bourbon field.

COLORADO

Morgan County:
Stuarco Oil Co. et al. 1 Ambrose, OWWO. C NW NW 6-2n-58w. IPP 126 BOPD, with trace water, "D" sand 5,878½-81½ ft. TD 6,050 ft. "D" sand discovery, new field.

Ambassador Oil Corp. 1 Parachini, C SE SW 30-5n-59w. IPF 240 BOPD, 430 M.c.f.d., "D" sand 6,050-55 ft. TD 6,177 ft. "D" sand discovery, new field.

Washington County:
Champlin Oil & Refining Co. 1 Loudder, C SE SE 7-4s-53w. IPP 90 BOPD, 7 BWPD, "J" sand discovery, new field. TD 4,800 ft. "J" sand 4,660-65 ft.

KANSAS

Hamilton County:
Hamilton Brothers Inc. 1-30 D. Conners. 30-23s-40w. IP 1,049 M.c.f.d., Winfield 2,444-54 ft. TD 2,460 ft. Shut in gas discovery.

Marion County:
Buick Drilling Co. 1 Rudolph, SE NE SE 24-18s-3e. IP 2 M.M.c.f.d., Miss. 2,433-35 ft. TD 2,450 ft. Shut in gas well.

Cam-Am Petroleum Co. 1 Tajchman, C SE NW 21-19s-5e. IP 1,020 M.c.f.d., Miss. 2,238-52 ft. TD 2,318 ft. Opens Tajchman field.

Morton County:
Graham-Michaelis Drilling Co. 1-18 Shrauner, C SE SE 18-35s-42w. IP 6 BOPD, 37°, Upper Morrow 4,469 and 4,473 ft. TD 4,891 ft.

Russell County:
Birmingham-Bartlett Drilling Co. 1 Woydziak "B" SE NE SW 25-15s-12w. IP 141 BOPD, 36°, Arbuckle 3,309-19 ft. TD 3,319 ft. Opens West Driscoll field.

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- inherent self-alignment
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Saline County:
Solar Oil Co. 1 Dieter, C E½ SW NE 7-15s-2w. IP 192 BOPD, 96 BWPD, 35°, Maquoketa 3,219-25 ft. TD 3,225 ft. Opens Dieter field.
Stafford County:
CRA and Rex & Morris 1 Petro, SW SW NE 9-24s-15w. IP 113 BOPD, 4½ BWPD 31.4°, Simpson 4,034-57 ft. TD 4,104 ft.

NEW MEXICO

Eddy County:
G. W. Strake 1 Union, 23-19s-30e. IPP 76 BOPD, 32°, Permian 1,742-1,809 ft. TD 3,706 ft. New oil discovery.
Lea County:
Sunray Mid-Continent Oil Co. 1-X New Mexico-State, 8 miles south of Lovington in 20-17s-36e. IPF 545 BOPD, 18/64-in. choke, 35.9°, GOR 734:1, TP 400 psi., packer, Abo 9,002-04, 9,009-14, 9,024-62, 9,109-19 ft. TD 9,311 ft. New Abo reef discovery.
San Juan County, Rattlesnake:
Continental Oil Co. 1-36 Rattlesnake, NW SE 2-29n-19w. IPP 39 BOPD, 391 bbl. salt water, Paradox 6,726-50 ft. TD 6,853 ft. Paradox discovery, new pool.

NORTH LOUISIANA

Claiborne Parish:
Murphy Corp. 1 Greer, C SE NW 10-23n-6w, 3¾ miles north of Colquitt and 1⅞ miles east of Haynesville field. IP 185 BOPD, 9/64-in., 49°, TP 2,510 psi., GOR 1,390 cu. ft. per barrel, perf. 9,995-97 ft., Smackover. TD 10,271 ft. New-field discovery.

SOUTH LOUISIANA

Evangeline Parish:
J. P. Owen 1 Edgar Miller, 7-6s-2e. IP 105 BOPD, 8/64-in., 43.5°, TP 2,600 psi., GOR 5,523 cu. ft. per barrel, perf. 10,027-31 ft. TD 10,460 ft. New-field discovery.
Lafayette Parish:
Skelly Oil Co. 1 L. T. Siadous, 26-9s-3e. IP 60 BCPD, 250 M.c.f.d., 6/64-in., 54°, TP 3,285 psi., GLR 3,383 cu. ft. per barrel, perf. 13,049-58 ft. TD 14,800 ft. New pay in northeast extension area of Scott area.

MONTANA

Stillwater County, Twin Buttes Area:
Shoreline Petroleum Co. 1 C. F. Kirchner, C NE SW 4-2n-20e. IPAOF 840 M.c.f.d., Eagle 1,230-60 ft. TD 4,064 ft. Eagle gas discovery, new field.

NORTH TEXAS

Knox County:
Thurman E. McGaugh, Jr., Trustee 1 R. L. Ratliff, 2½ miles south of Goree in Robert Wilkens Sur. A-411. IPP 21 BOPD, plus 42 BWPD, 39°, GOR 250:1. Tannehill sand 1,679-84 ft. TD 1,721 ft. New oil discovery.

TEXAS GULF COAST

Brazoria County:
General Crude Oil Co. 3 Houston Farms, Lot 5, S. F. Austin Sur., A-37, 2 miles southeast of Chocolate Bayou field. IP 5,300 M.c.f.d., TP 4,300 psi., perf. 12,510-18 ft., Frio. TD 13,472 ft. New pay in unnamed new field.
Hardin County:
Sinclair Oil & Gas Co. 1 A. A. Burrell Fee, A. A. Burrell Sur., A-5, 8 miles northwest of Silsbee. IP 260.82 BOPD, 9/64-in., 47.4°, TP 4,250 psi., GOR 5,821 cu. ft. per barrel. perf. 10,091-99 ft. and 10,104-09 ft., Wilcox. TD 12,000 ft. Discovery well of Burrell field.
Jackson County:
Slick Oil Corp. 1 M. J. Donnelly, Blk. 13, McCrory Subd., Crews Ranch, R. Solis Sur., A-73, 5 miles southeast of Inez. IP 41 BOPD, 7/64-in., 48.5°, TP 1,390 psi., GOR 8 M.c.f. per barrel, perf. 7,796-5,802 ft., Frio. TD 6,920 ft. New pay in Witte field.

TEXAS PANHANDLE

Hemphill County, Feldman Area:
Humble 1 Charles G. Newcomer, 5 miles south of Higgins in Sec. 2, Blk. 43, H&TC Sur. IPAOF 8,900 M.c.f.d., SIP 4,733 psi., GLR 38,700:1, 52.5°, Morrow 11,930-50 ft. TD 12,240 ft. Gas discovery.
Lipscomb County, Follett area:
Odessa Natural Gas Co. 1 Hoeppner, 4 miles northeast of Follett, Sec. 85, Blk. 10, HT&B Sur. IPAOF 16,200 M.c.f.d., plus 20 BOP M.M.c.f.d., 65°, SIP 2,464 psi., GOR 50,000:1. Morrow 8,733-59 ft. TD 9,250 ft. Gas-condensate discovery.

LEGAL

SEALED BIDS FOR OIL AND GAS lease purposes will be received until 2:00 P.M., C.S.T., February 21, 1961 to be opened at such time in the Pawnee area field office, Pawnee, Oklahoma for the leasing of one tract of tribal land comprising 10 acres, and 104 tracts of individually allotted Indian lands comprising 6,560 acres.
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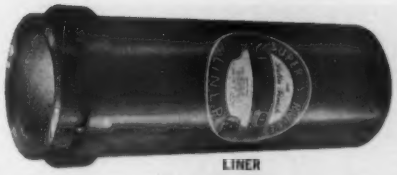
December well countdown in the U. S.

	Total completions											Wildcats							
	Total	Oil	Cond.	Gas	Dry	Service	Footage	Total 1960	Total 1960 footage	Cable tool comp.	D.D.	Total	Oil	Cond.	Gas	Dry	Footage	Total 1960 wildcats	Total 1960 wildcat footage
Alabama	4	3	0	0	1	0	30,920	45	448,741	0	0	1	0	0	0	1	4,515	7	34,884
Alaska	5	3	0	1	1	0	46,555	23	230,372	0	0	1	0	0	0	1	8,634	8	75,944
Arizona	5	0	0	0	5	0	21,121	35	86,157	0	0	4	0	0	0	4	19,941	23	64,075
Arkansas	65	31	0	3	31	0	239,582	615	2,212,579	0	0	8	1	0	0	7	39,489	145	563,285
California	196	151	0	9	35	1	637,979	1,709	7,447,424	0	6	28	2	0	4	22	171,267	302	1,747,489
Colorado	105	11	3	25	66	0	488,336	706	3,475,195	0	3	55	2	1	4	48	232,135	358	1,755,191
Florida	1	0	0	0	1	0	14,000	5	60,332	0	0	1	0	0	0	1	14,000	5	60,332
Georgia	1	0	0	0	1	0	4,551	1	4,551	0	0	1	0	0	0	1	4,551	1	4,551
Idaho	0	0	0	0	0	0	0	1	1,182	0	0	0	0	0	0	0	0	1	1,182
Illinois	241	85	0	1	87	68	514,710	2,373	4,822,824	62	13	52	4	0	1	47	87,994	502	922,904
Indiana	96	33	0	1	60	2	123,408	1,069	1,458,518	81	5	19	0	0	1	18	19,366	366	447,868
Iowa	0	0	0	0	0	0	0	4	4,277	0	0	0	0	0	0	0	0	4	4,277
Kansas	529	268	0	33	188	40	1,269,500	4,288	12,443,871	191	0	111	9	0	6	96	415,594	1,056	3,931,793
Kentucky	203	120	0	8	75	0	243,475	2,180	2,914,439	175	5	10	1	0	3	7	11,473	223	312,851
Louisiana	397	216	26	30	124	1	2,935,128	3,707	28,675,634	0	0	42	3	4	1	34	349,739	552	4,670,066
North	156	79	0	22	55	0	477,802	1,452	5,368,477	0	0	23	2	0	1	20	124,312	268	1,361,673
South	206	114	22	7	62	1	2,072,703	1,765	18,068,180	0	0	16	1	3	0	12	183,499	250	2,865,476
Offshore	35	23	4	1	7	0	384,623	490	5,238,977	0	0	3	0	1	0	2	41,928	34	442,917
Michigan	47	17	0	2	28	0	160,124	897	3,054,219	31	0	18	0	0	0	18	67,327	246	914,027
Mississippi	82	28	3	2	49	0	714,717	695	6,831,980	0	0	32	3	0	0	29	263,129	267	2,546,059
Missouri	0	0	0	0	0	0	0	29	47,037	0	0	0	0	0	0	0	0	29	47,037
Montana	41	15	0	1	25	0	202,034	353	1,665,414	0	0	22	0	0	1	21	97,232	168	704,623
Nebraska	94	31	0	0	63	0	458,097	896	4,873,840	0	1	40	2	0	0	38	190,110	392	2,088,178
Nevada	0	0	0	0	0	0	0	3	11,762	0	0	0	0	0	0	0	0	3	11,762
New Mexico	154	81	0	41	32	0	842,531	1,850	9,225,984	53	0	14	3	0	0	11	59,682	250	1,237,126
West	68	20	0	41	7	0	386,091	685	3,308,154	21	0	3	0	0	0	3	13,692	70	258,434
East	86	61	0	0	25	0	456,440	1,165	5,917,830	32	0	11	3	0	0	8	45,990	180	978,692
New York	25	8	0	4	6	7	42,701	300	509,168	25	0	4	0	0	1	3	12,021	44	151,705
North Carolina	0	0	0	0	0	0	0	3	4,896	0	0	0	0	0	0	0	0	3	4,896
North Dakota	21	11	0	0	10	0	133,037	283	1,806,751	0	1	6	0	0	0	6	50,411	82	506,983
Ohio	133	60	0	38	30	5	359,294	1,099	2,763,850	133	0	9	0	0	3	6	38,950	55	201,540
Oklahoma	606	315	4	53	142	92	1,864,290	4,802	17,431,529	281	0	65	16	3	10	36	330,265	700	3,592,838
Oregon	2	0	0	0	2	0	5,879	11	40,206	0	0	2	0	0	0	2	5,879	11	40,206
Pennsylvania	48	12	0	17	7	12	126,562	860	2,416,950	40	0	2	0	0	0	2	9,926	20	119,144
South Dakota	1	0	0	0	1	0	901	22	138,181	1	0	1	0	0	0	1	901	11	43,885
Tennessee	3	0	0	0	3	0	3,157	92	78,962	3	0	3	0	0	0	3	3,157	88	77,743
Texas	1,467	764	59	69	525	50	6,139,987	15,581	66,492,798	217	10	269	15	8	5	241	1,221,995	3,166	14,450,367
District 1	110	62	1	0	43	4	285,267	1,126	3,023,777	20	0	21	0	0	0	21	70,138	385	1,158,309
District 2	73	11	7	13	42	0	516,203	756	5,089,550	0	0	15	0	0	0	15	102,605	184	1,310,079
District 3	96	36	13	2	45	0	652,819	1,163	8,142,531	0	2	17	0	1	0	16	154,929	218	2,014,338
District 4	98	33	6	9	49	1	624,766	1,074	5,959,888	16	1	29	0	1	1	27	189,761	302	1,734,880
East (5 & 6)	124	67	11	3	43	0	574,914	1,311	6,068,810	0	0	27	2	1	0	24	108,013	273	1,438,204
District 7-B	239	109	5	14	105	6	721,574	2,231	6,395,670	51	0	69	6	3	4	56	234,579	631	1,947,459
West (7-C & 8)	359	242	8	7	94	8	1,813,632	3,976	19,948,850	59	4	59	4	1	0	54	242,668	632	2,868,730
District 9	282	158	5	3	87	29	592,716	2,903	7,184,154	71	2	28	2	1	0	25	91,297	484	1,531,970
District 10	86	46	3	18	17	2	358,096	1,041	4,679,568	0	1	4	1	0	0	3	28,005	57	446,398
Utah	28	10	0	3	15	0	166,219	243	1,382,830	0	0	15	1	0	1	13	83,837	96	540,780
Virginia	0	0	0	0	0	0	0	8	39,584	0	0	0	0	0	0	0	0	0	0
Washington	1	0	0	0	1	0	4,137	5	30,652	0	0	1	0	0	0	1	4,137	5	30,652
West Virginia	99	11	0	70	17	1	233,008	884	2,161,149	95	0	2	0	0	0	2	13,087	11	77,966
Wyoming	110	47	0	5	56	2	600,512	1,074	5,408,834	6	1	45	2	0	0	43	272,801	435	2,345,441
Total December 1960	**4,810**	**2,331**	**95**	**416**	**1,687**	**281**	**18,626,452**	**46,751**	**190,702,672**	**1,394**	**45**	**883**	**64**	**16**	**40**	**763**	**4,103,545**	**9,635**	**44,329,650**
Total November 1960	3,838	1,732	103	362	1,377	264	14,737,386	.....	.....	848	35	715	66	9	24	616	3,285,935	.....	.....
Total 1960	**46,751**	**21,186**	**1,306**	**3,952**	**17,574**	**2,733**	**190,702,672**	.....	.....	**11,260**	**588**	**9,635**	**853**	**112**	**336**	**8,334**	**44,329,650**	.....	.....

The Mission  Mission

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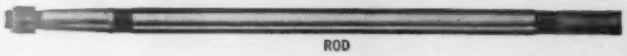
Mission  Mission

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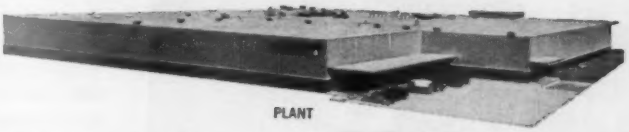
LINER PACKING

Mission and Mission

GLAND PACKING

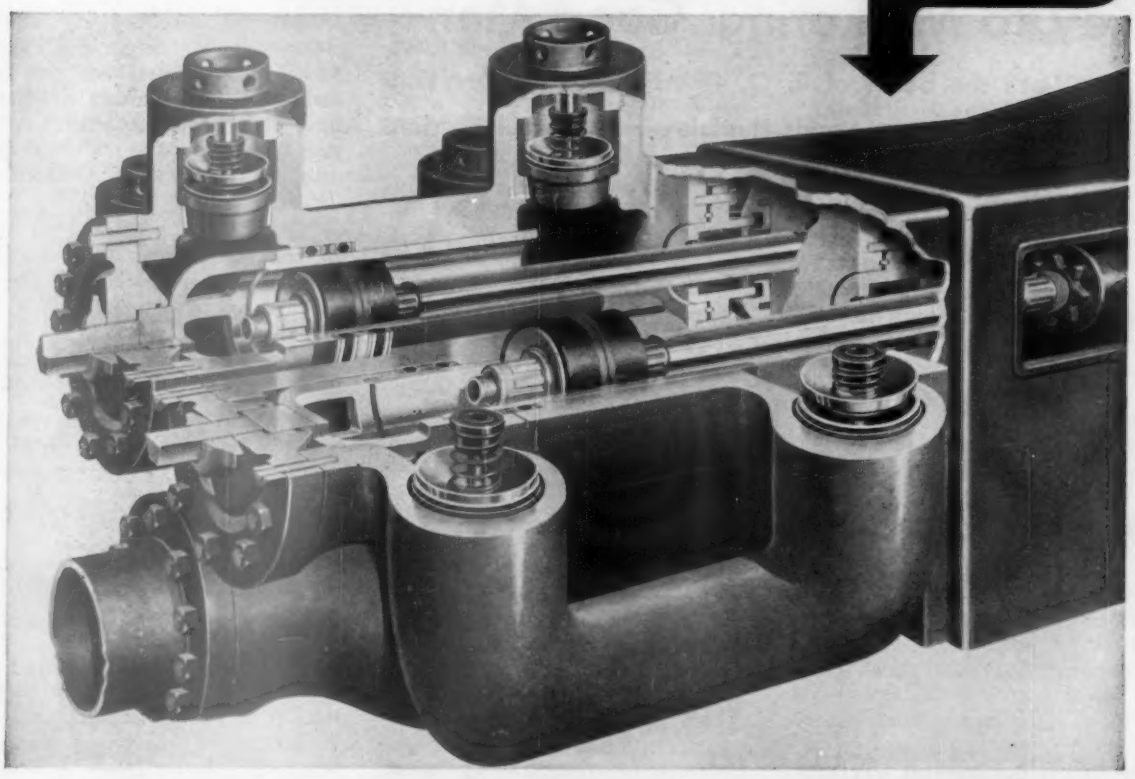
VALVE & SEAT

are all designed and made in our

modern  to work

PLANT

together to cut your drilling costs.



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MISSION MANUFACTURING CO.

Robert O. Goodykoontz . . . cars haven't changed much.

Key to Marketing: Good Men

• That's the belief of R. O. Goodykoontz, a long-time marketer who now heads Humble's vast central division.

IT'S THE appeal of the man at the pump that sells your gasoline and makes a successful station.

Clever merchandising helps. You can entice motorists into a station with giveaway coupons, a half-block of flapping pennants, or a blaring cutout.

But they keep coming back in numbers only if the dealer's "it" shows—that priceless and mysterious quality which makes motorists want to do business with him.

Station appearance, product quality, and location are important. But in the last analysis, the man's the thing.

Thinking out loud is market-toughened Robert O. Goodykoontz, a new boss of exploration, production—and marketing—in a 1,400,000-sq. mile area of the central and western United States. This is Humble Oil & Refining Co.'s central division, from Montana south to Texas and from Michigan west to Washington.

For 30 years Goodykoontz has concerned himself almost exclusively with marketing. But despite the pressures of this competitive division, his hair is black and no ulcer worries him.

Two problems, he says, bother marketers today.

One is how to spot the right man to run the service stations—a man who'll bring in the business no matter what the location, the state, or the economics.

The other is how to increase gasoline sales.

"The railroad locomotive has changed drastically," says Goodykoontz, who railroaded part-time for 8 years while going to high school and college. "Diesel consumption is mounting by the hour.

"Airplane travel is being revolutionized every year. Jets use many, many times the volume of gasolines used by the old DC3's.

"But the automobile hasn't changed much. The gas tank of the Model T compares with the gas tanks of today. The cars still have four wheels. The marketer has to take this vehicle and try to get the man behind the wheel to increase its use."

It's a tough problem, but the picture isn't dismal. Goodykoontz says marketing always has been tough, a competitive free-for-all. "We like it and we wouldn't want it any other way. It's far superior to outside regulations or controls."

A vigorous, stocky man, Goodykoontz has spent his entire business

▶▶▶ Personals

John C. Wright, vice president of Wiser Oil Co., has been named president. He succeeds **P. W. Neuenschwander,** now chairman.

Don MacLaren, section head in Esso Research & Engineering Co.'s petroleum-development division, has been transferred to process research as section head. **Woody Brown** will succeed MacLaren in petroleum development.

Arnold F. Kaulakis has been elected vice president, a director, and member of the executive committee of Esso Research & Engineering Co. He will be responsible for engineering operations of the company. Kaulakis had been acting general manager of engineering. He also has served as director of the process-research division.

J. J. Uri has joined Murphy Oil Co. of Oklahoma, Inc., in Tulsa as chief geologist. He had been exploration manager for C. L. McMahon, Inc., in Tulsa.

Ray W. Amstutz, Earlougher Engineering, has been elected chairman of the Tulsa section, National Association of Corrosion Engineers. Other officers are **James A. Rush,** Nalco Chemical Co., vice chairman; and **John M. Taylor, Jr.,** Pan American Petroleum Corp., secretary.

career with Jersey Standard companies. Born in Radford, Va., he completed a business administration course at Virginia Polytechnic Institute, working summers as a machinist apprentice in railroad yards. He broke a leg during his freshman year of college football and spent the next 3 years as assistant manager, then manager, of the football team.

Three weeks after graduation, he began work at an Esso service station in Richmond. A recruiter spotted him, and he started a climb that led to Esso Standard's board of directors.

Goodykoontz is chairman of the API jobbers-advisory committee and is active in the American Ordnance Association, a civilian supply arm of the military. He's swung through his share of offices in advertising and sales-executive clubs, has completed some night college courses at the University of Richmond, and has attended the Harvard Business School's advanced course.

Twenty states are in his present domain. In 16 of them, the Humble banner flies. Kansas, Missouri, and Minnesota are in the "invasion" plans. Michigan, with its 7,000,000 prospective customers and a concentration of population, is a particular apple of his eye.

Marketing still is a good field to get into, says Goodykoontz.

"Everyone seems to be looking for a panacea for marketing problems," he says. "Well, we aren't going to find a panacea. We keep looking for something new, for some cure. We need more customers. They are there.

"And there isn't a station that couldn't handle three times the business it's doing."

H. A. Oden has been named district engineer in Billings, Mont., for U. S. Geological Survey. He succeeds the late Harry H. Perrigo. **Rodney A. Smith** will be assistant to Oden.

Louis F. Davis, regional division manager in Atlantic Refining Co.'s domestic producing department, has been named assistant general manager, domestic producing department. He will become general manager after retirement of **Edgar Kraus** in May.

DAVIS

BOUNDS

I. G. Davis and **J. E. Bounds** have been elected executive vice presidents of Gulf Oil Corp., and **B. R. Dorsey** has been named senior vice president. Davis had been a senior vice president. Bounds was administrative vice president and coordinator of the financial department. Dorsey was administrative vice president and coordinator of the manufacturing department. All three will continue to headquarter in Pittsburgh.

DORSEY

L. T. Sloan, assistant division superintendent in Texas Gas Transmission Corp.'s pipeline department, Owensboro, Ky., has been appointed assistant manager of the Louisiana division.

E. Ray Laughner, general superintendent of crude-oil pipelines for Ashland Oil & Refining Co., has been named director of the management-engineering department. **Gayle J. Wells**, crude-oil representative in Evansville, Ind., will move to Ashland, Ky., to succeed Laughner. **Robert W. Exline,** administrative assistant in the crude-oil supply and pipeline department, has been named assistant manager of this department.

▶▶▶ Personals

Howard S. McCray, assistant to the president of Texaco Inc., has been named president of Texas Pipe Line Co., succeeding **John W. Emison,** who will retire April 1 after 41 years of service. McCray has been superintendent of Texaco refineries at Sunburst, Mont., Amarillo, Tex., Lawrenceville, Ill., and Lockport, Ill. He also has been manager of the refining department's operations division, manager of Texaco's purchasing department, and chairman and chief executive officer of Texas-Zinc Minerals Corp., a Texaco affiliate.

Sam G. Gary, vice president and general manager of Core Laboratories-Canada, Ltd., has been elected president and chief executive officer.

Arthur B. Hersberger, general manager of foreign marketing and manager of special sales for Atlantic Refining Co., has been appointed general manager of marketing. **Milton G. Davis** will be general manager, domestic marketing. Both appointments are effective February 1. **Dwight T. Colley,** vice president of Atlantic, is scheduled to retire May 1 after 40 years with the company.

NEW PRESIDENT of Association of Oilwell Servicing Contractors is A. A. McAlister, second from left, McAlister Well Service, Wichita Falls, Tex. Other officers named at AOSC's fifth annual meeting January 20-21 include, left to right, R. L. Gerlich, Pool Well Servicing Co., San Angelo, Tex., treasurer; McAlister; James E. Danheim, AOSC executive secretary; and Joe M. Mills, Mills Drilling Co., Seminole, Okla., first vice president.

▶▶▶ Personals

L. G. (Gayle) Rodgers, manager of engineering for Sunray Mid-Continent Oil Co., has been named vice president of Sunray Chemical Co. Rodgers has been with Sunray since 1948. He has been general superintendent of the gas-gasoline department, manager of technical services, and gas division general manager for Sunray. **Gordon E. Hillhouse** will succeed Rodgers as manager of engineering. **Oran A. Graybeal,** western division production manager in Denver, will succeed Hillhouse as administrative assistant to **R. E. Foss,** senior vice president, production.

RODGERS

Norton Belknap has been appointed assistant regional coordinator for operations of Standard Oil Co. (N. J.) in the Far East and South and East Africa. He will assist **H. W. Cobb,** regional coordinator for this area. **H. W. Blose** has succeeded Belknap as secretary to the Jersey board advisory committee on investments.

F. E. Coupal, production geologist with Shell Oil Co., has been transferred to Roswell, N. M., from Midland, Tex.

W. G. Osborne, manager of the gasoline division of Arkansas Fuel Oil Corp. in Shreveport, La., has been transferred to Bartlesville, Okla., as general superintendent of Cities Service Petroleum Co.'s gasoline division.

John C. Bayless has joined Doeringsfeld, Amuedo & Ivey, Denver consulting firm, as manager of engineering-geology operations. Bayless had been with Texaco Inc. and Abrams Aerial Survey Corp. before joining DAI.

Davis D. Hunt has been named head of the new oil-field chemicals research and development group of Hagan Chemicals & Controls, Inc. The new group will work with improvement of water-treatment methods and development of new chemicals for use in water-treatment problems.

Alex W. Francis, Jr., vice president for sales and a director of National Tank Co., has been elected president. **C. G. Wells,** executive vice president, has been elected vice chairman of the board and chief executive officer. Francis succeeds

FRANCIS

WELLS

Jay P. Walker as president of National Tank. Walker, a founder of the company, will continue as chairman. **Judson D. Lowd,** vice president, manager of the export division, and a director, will succeed Wells as executive vice president.

Louis W. Gardner has been named director of the geophysical-research division of Gulf Research & Development Co. He succeeds **T. J. O'Donnell,** recently named associate director of Gulf laboratories. Gardner had been technical assistant to O'Donnell.

▶▶▶ Deaths

I. G. (Ike) Morgan, 56, vice president and chief executive officer for Texaco Inc., in Los Angeles, collapsed and died January 19 while addressing an American Petroleum Institute-Western Oil and Gas Association meeting in a downtown Los Angeles hotel. Death apparently was caused by a heart attack. Morgan, who served at one time as Texaco's vice president in charge of sales in New York, joined the company in 1931.

Court M. Clark, 48, vice president of John M. Stahl Oil Co., Los Angeles production firm, died January 15 at his home in Santa Monica, Calif.

Samuel A. Guiberson, Jr., 87, pioneer California oil man, died January 16 in a Pasadena hospital. Guiberson was active in early drilling and development of California fields and supervised construction in 1904 of the first major pipeline in the state. During World War I he served as director of pipelines for the Government. He was founder of Guiberson Corp., equipment firm which was sold to Dresser Industries in 1956. He was one of the original directors of American Petroleum Institute.

George M. Reading, 82, one of the founders of Reading & Bates Drilling Co., died January 19 in Dallas. The drilling firm was founded in Ranger, Tex., during the oil boom in that area.

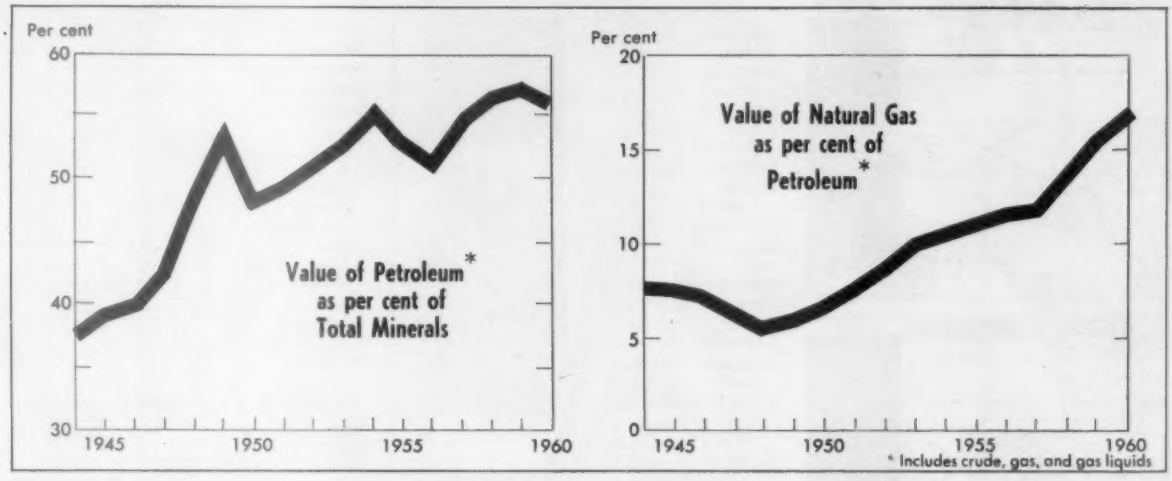
John E. Mabee, 81, Tulsa oil man and philanthropist, died January 24 in a Tulsa hospital. He had been in poor health for some time. Mabee was nearly penniless when he came to Oklahoma in 1907. He made his start in the oil business by leasing his homestead. He then began to sell leases and to drill himself. His drilling activities grew until he was at one time one of the largest oil well drilling contractors. In later years Mabee was known for his many philanthropies. He was president of Mabee Petroleum Corp. at the time of his death.

William Mark Blake, 77, Lubbock, Tex., independent operator, died January 19 in a Lubbock hospital after a long illness.

Saul A. Levine, 51, a founder and executive vice president, secretary, and director of Consolidated Oil & Gas, Inc., died January 17 in Denver after a heart attack.

Louis Fred Tuel, 62, tool pusher with Superior Oil Co., died January 19 in a Bakersfield, Calif., hospital.

Robert Frank Aldredge, 65, vice president of Seismograph Service Corp. of Mexico, died January 23 in Mexico City of a heart ailment. He had been with Seismograph Service since 1936 in Venezuela, Colombia, Argentina, Iran, and Mexico.



Petroleum valued at 56% of all minerals

BY JOHN C. CASPER

TOTAL mineral production in this country last year had a value of 17.83 billion dollars, according to estimates of the Bureau of Mines. Fuels accounted for 68.3% of the total and other nonmetals for 20.4%. Metal ores accounted for the remaining 11.3%.

Petroleum, including crude, natural gas, and natural-gas liquids, had a total value of 10.04 billion dollars at the well. The breakdown was 7.50 billion dollars for crude, 1.73 for natural gas, and 0.81 for natural-gas liquids.

Other fuels were valued at 2.14 billion dollars for the year. This category includes bituminous and anthracite coals plus about 4.6 million dollars worth of peat.

Other nonmetals were valued at 3.63 billion. Metals accounted for the remaining 2.01 billion to round out the total.

Gold output for 1960 was estimated at 58 million dollars and silver at 27 million. It is interesting to note that the combined value of silver and gold was only slightly more than one-tenth of the value assigned to natural-gas liquids at plants.

Crude, gas, and gas liquids accounted for 56.31% of the total value of all minerals produced during the year. The chart on the left shows that the petroleum portion of the total has been above 50% since 1952. Peaks for the years 1949 and 1954 were influenced more by declines in production of other minerals than to unusual output of petroleum.

The general trend for petroleum's position in the minerals industry has been up, particularly since the end of World War II. The slight downturn in 1960 was due to lower crude production for the year. Part of crude demand during the year was met through a reduction in crude stocks.

The bureau estimated that the average barrel of crude produced last year had a value of $2.92 at the well, up 2 cents from 1959. The average value of natural gas rose 0.7 cent to 13.6 cents per M.c.f. Gas liquids showed a small increase of 0.1 cent a gallon to 5.7 cents.

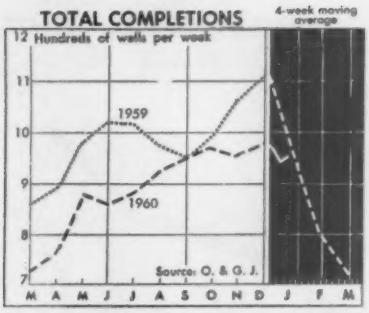
The second chart shows the value of natural gas, expressed as per cent of total petroleum. The low point in the series was in 1948 when gas accounted for 5.52% of the total. Its position had climbed to 17.19% last year. Prices increased during the period but remained low compared with crude on an energy basis. In contrast with its position at 17.19% of total petroleum value, gas energy represented 38.5% of petroleum energy produced last year.

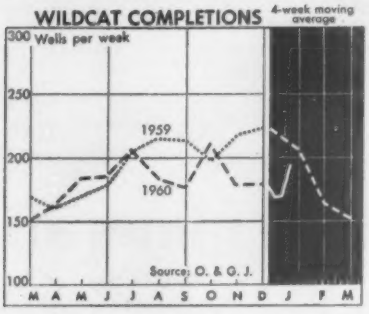
If all last year's gas could have been replaced by crude on an energy basis, petroleum would have accounted for 72.1% of all mineral value last year.

A quick look at the highlights . . .

	LATEST WEEK	Change from WEEK AGO		Change from YEAR AGO	
Production	7,192,985	UP	56,745	DOWN	59,071
Crude stocks	239,242,000	UP	1,610,000	DOWN	10,771,000
Completions	1,241	UP	359	UP	382
Refinery runs	8,357,000	UP	15,000	UP	130,000
Gasoline stocks	204,767,000	UP	4,498,000	UP	4,862,000
Kerosine Stocks	28,826,000	DOWN	720,000	UP	2,960,000
Distillate stocks	123,226,000	DOWN	4,341,000	DOWN	9,412,000
Residual stocks	45,235,000	DOWN	55,000	DOWN	4,854,000
Four-product stocks	402,054,000	DOWN	618,000	DOWN	6,444,000
Total imports	1,745,100	DOWN	394,700	DOWN	64,700

Active Rotary Rigs





	1-23-61	1-16-61	1-25-60
Alabama	7	7	5
Alaska	7	7	(†)
Arkansas	13	14	11
Arizona	1	1	0
California	76	77	67
Land	72	73	61
Offshore	4	4	6
Colorado	25	35	29
Florida	3	5	2
Land	3	3	1
Offshore	0	2	1
Georgia	1	2	0
Illinois	31	30	18
Indiana	2	5	3
Iowa	0	0	1
Kansas	92	94	100
Kentucky	4	4	8
Louisiana	254	258	287
North	24	23	32
S. Inland waters	92	90	114
S. Land	85	90	85
Offshore	53	55	56
Michigan	20	21	36
Mississippi	38	48	72
Missouri	0	0	1
Montana	18	23	15
Nebraska	18	13	16
Nevada	1	1	0
New Mexico	97	87	97
New York	0	1	0
North Dakota	10	14	24
Ohio	4	4	4
Oklahoma	169	171	169
Oregon	1	1	0
Pennsylvania	11	8	14
South Dakota	0	0	4
Texas	557	541	553
S. Inland waters	5	8	7
S. Land	145	147	157
Offshore	2	2	0
North	44	43	113
Panhandle	57	59	(*)
East	50	44	(*)
West Central	‡145	‡137	181
West	109	101	95
Utah	27	28	28
Washington	2	1	1
West Virginia	4	3	4
Wyoming	51	55	54
Total U. S.	**1,544**	1,559	1,623
Western Canada	162	160	241
Eastern Canada	0	0	4
Grand total	1,706	1,719	1,868

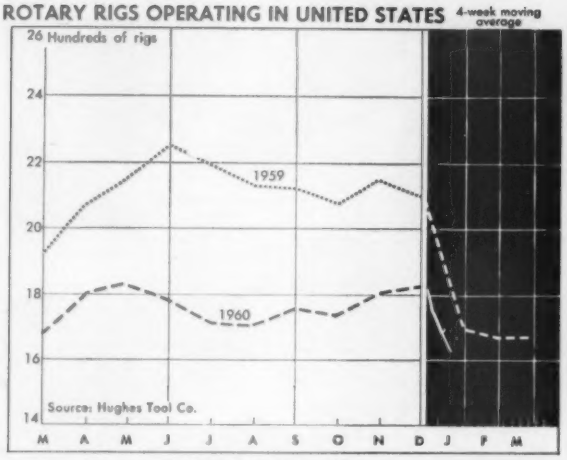
Hughes Tool Co. report. *Included in North. Comparisons not available due to change in method of reporting. †Data first reported 4-4-60. ‡Stephens and Eastland counties now included in West Central.

WEEKLY WELL COMPLETIONS . . . WEEK ENDED JANUARY 21, 1961

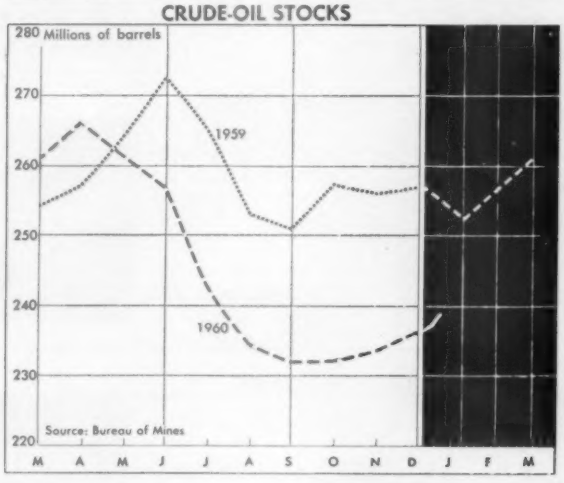
	Total wells							Cum.		Total wildcats					Cum.	
	Total	Crude	Cond.	Gas	Dry	Service	Footage	1961	1960	Total	Crude	Cond.	Gas	Dry	1961	1960
Arkansas	9	0	0	0	9	0	40,421	28	39	3	0	0	0	3	12	10
California	29	17	0	3	8	1	124,874	142	122	4	0	0	0	4	18	30
Colorado	31	4	0	4	23	0	113,728	53	48	20	0	0	1	19	32	27
Illinois	46	22	0	0	11	13	111,316	135	163	7	1	0	0	6	30	39
Indiana	17	8	0	0	9	0	32,427	54	66	1	1	0	0	0	9	23
Kansas	71	38	0	3	20	10	199,222	309	242	15	5	0	0	10	70	78
Kentucky	59	15	0	6	38	0	84,220	162	172	7	0	0	0	7	12	23
Louisiana	66	36	3	6	21	0	612,212	332	249	6	1	1	0	4	47	34
North	11	5	0	2	4	0	30,472	101	79	1	0	0	0	1	20	16
South	37	15	3	4	15	0	390,507	174	127	5	1	1	0	3	27	17
Offshore	18	16	0	0	2	0	191,233	57	43	0	0	0	0	0	0	1
Michigan	23	5	0	1	17	0	80,548	59	59	11	0	0	0	11	29	20
Mississippi	11	3	0	0	8	0	101,297	52	57	7	0	0	0	7	23	21
Montana	11	4	0	2	5	0	37,678	25	19	4	0	0	0	4	11	10
Nebraska	15	1	0	0	14	0	74,994	41	58	11	0	0	0	11	23	23
New Mexico	45	22	0	9	14	0	219,636	96	151	4	0	0	0	4	13	18
West	20	6	0	8	6	0	106,114	46	55	2	0	0	0	2	7	3
East	25	16	0	1	8	0	113,522	50	96	2	0	0	0	2	6	15
New York	0	0	0	0	0	0	0	87	25	0	0	0	0	0	0	2
North Dakota	6	4	0	0	2	0	41,505	13	23	0	0	0	0	0	1	5
Ohio	13	10	0	2	1	0	22,683	48	106	0	0	0	0	0	1	3
Oklahoma	141	45	3	15	52	26	451,059	285	262	29	4	0	1	24	41	51
Pennsylvania	0	0	0	0	0	0	0	50	6	0	0	0	0	0	4	2
Texas	592	287	47	36	207	15	2,708,430	1,063	1,335	146	7	8	5	126	235	284
Dist. 1	36	12	0	2	17	5	99,679	63	102	13	0	0	1	12	24	37
Dist. 2	43	4	14	16	7	2	299,036	77	64	9	0	3	2	4	11	16
Dist. 3	27	12	0	1	14	0	201,176	84	130	8	1	0	0	7	19	22
Dist. 4	81	34	19	9	19	0	508,026	140	141	17	2	3	1	11	37	36
East	54	27	3	0	22	2	291,540	91	112	14	0	0	0	14	22	30
Dist. 7-B	68	29	1	1	37	0	219,665	126	153	22	2	1	0	19	33	50
West	124	73	2	2	44	3	626,981	228	365	34	2	0	1	31	49	46
Dist. 9	116	64	5	1	43	3	286,802	162	221	27	0	0	0	27	35	43
Dist. 10	43	32	3	4	4	0	175,525	92	47	2	0	1	0	1	5	4
Utah	5	1	0	0	4	0	33,329	14	18	5	1	0	0	4	12	8
West Virginia	20	5	0	15	0	0	52,871	62	45	0	0	0	0	0	0	1
Wyoming	21	6	0	1	14	0	78,329	64	64	11	1	0	0	10	29	34
*Miscellaneous	10	2	0	0	8	0	46,986	30	22	8	0	0	0	8	24	18
Total U. S.	**1,241**	535	53	103	485	65	5,267,765	3,158	3,351	**299**	21	9	7	262	676	764
Previous week	882	389	35	76	337	45	4,218,563	.....	.....	177	12	3	7	155	.....	.....
Cum. 1961	3,158	1,415	129	283	1,170	161	13,618,080	.....	.....	676	48	14	22	592	.....	.....
Cum. 1960	3,351	1,580	139	239	1,299	94	14,737,179	.....	.....	764	64	10	18	672	.....	.....
Western Canada	42	16	0	5	21	0	269,278	149	88	17	0	0	3	14	43	21

*Incl. Wis., Ala., Fla., Ga.

ROTARY RIGS OPERATING IN UNITED STATES



CRUDE-OIL STOCKS



CRUDE-OIL STOCKS BY STATES OF ORIGIN*

(Thousands of barrels)

	1-14-61	1-7-61	1-16-60
Pennsylvania	2,182	2,168	2,263
Other Appalachian	1,231	1,367	2,024
Illinois, Indiana, Michigan	8,198	8,309	9,783
Nebraska and North Dakota	2,818	2,863	2,679
Kansas	9,172	8,912	9,905
Oklahoma	15,735	15,479	17,089
Arkansas	1,731	1,711	2,254
Louisiana	18,921	19,468	18,289
North	3,492	3,178	3,194
South	15,429	16,290	15,095
Mississippi, Alabama, Florida	1,985	1,885	2,606
New Mexico	7,548	7,454	8,105
Texas	100,961	99,702	106,651
East Texas	8,139	7,938	7,785
West Texas	46,234	45,204	50,171
Texas Gulf	18,426	18,067	19,167
Other Texas	28,162	28,493	29,528
Wyoming	17,479	17,166	16,801
Other Rocky Mountain	10,468	10,385	9,464
California	24,773	25,072	28,511
Foreign	†16,040	15,691	13,589
Total	**239,242**	237,632	250,013

*Bureau of Mines. †Includes 6,274,000 bbl. in California.

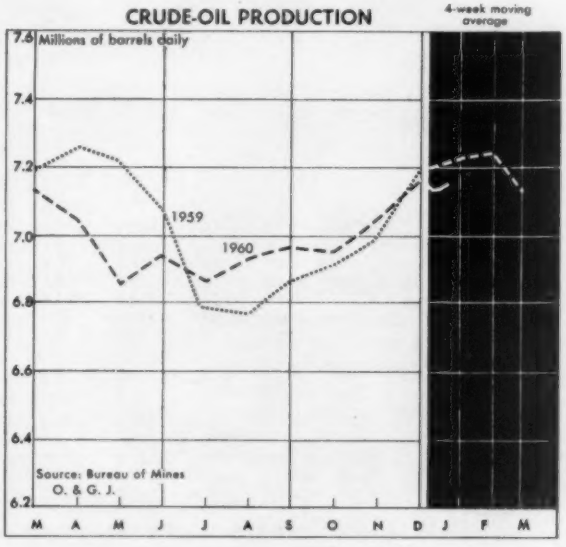
DAILY AVERAGE PRODUCTION FOR WEEK

	Jan. 21, 1961 Crude oil	Lease condensate	Total	Jan. 14 total
Alabama	21,200	.....	21,200	21,100
Alaska	6,500	.....	6,500	6,475
Arkansas	77,850	150	78,000	75,000
California	832,000	.....	832,000	836,400
Colorado	132,200	.....	132,200	132,000
Eastern	39,000	.....	39,000	36,800
Florida	1,000	.....	1,000	1,000
Illinois	215,400	.....	215,400	216,300
Indiana	34,200	.....	34,200	33,100
Kansas	†308,185	.....	†308,185	†290,865
Kentucky	59,300	.....	59,300	59,200
Louisiana	982,600	138,000	1,120,600	1,119,900
North	104,600	5,500	110,100	109,400
South	878,000	132,500	1,010,500	1,010,500
Michigan	48,500	.....	48,500	48,800
Mississippi	146,800	4,150	150,950	150,950
Montana	80,000	.....	80,000	79,500
Nebraska	65,000	.....	65,000	65,300
Nevada	100	.....	100	100
New Mexico	285,000	8,200	293,200	293,200
North Dakota	66,000	.....	66,000	69,000
Oklahoma	†536,650	.....	†536,650	†503,950
Texas	2,512,000	97,850	2,609,850	2,609,850
Dist. 1	42,000	3,700	45,700	45,700
Dist. 2	106,000	8,600	114,600	114,600
Dist. 3	321,000	39,000	360,000	360,000
Dist. 4	179,000	15,000	194,000	194,000
Dist. 5	27,000	500	27,500	27,500
Dist. 6	112,000	10,000	122,000	122,000
East Texas field	133,000	.....	133,000	133,000
Dist. 7-B	127,000	400	127,400	127,400
Dist. 7-C	115,000	3,550	118,550	118,550
Dist. 8	1,056,000	12,000	1,068,000	1,068,000
Dist. 9	193,000	2,500	195,500	195,500
Dist 10	101,000	2,600	103,600	103,600
Utah	114,500	.....	114,500	110,600
Wyoming	380,000	.....	380,000	379,100
Others	‡650	.....	‡650	‡750
Total U. S.	6,938,635	248,350	**7,192,985**	7,139,240
Change from previous week, up		.....	**53,745**	
Canada	†624,000	.....	†624,000	†598,000

Total U. S. prod.—Jan. 1-Jan. 21 ..... 150,404,200 bbl.
Same period last year (crude plus cond.) ..... *151,763,600 bbl.

*Includes 4,536,800 bbl. condensate. †Week ended previous Monday. ‡South Dakota and Arizona.

CRUDE-OIL PRODUCTION



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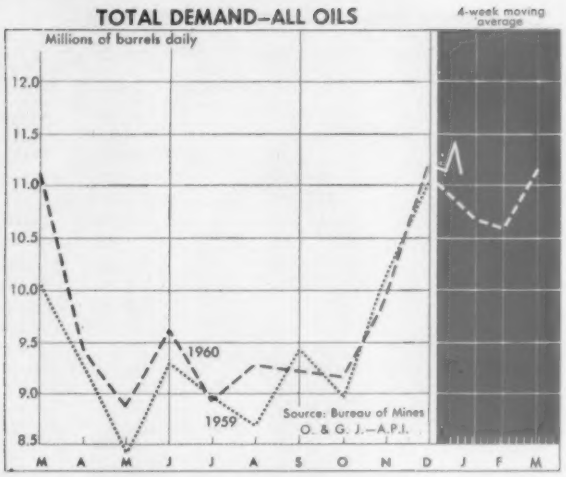

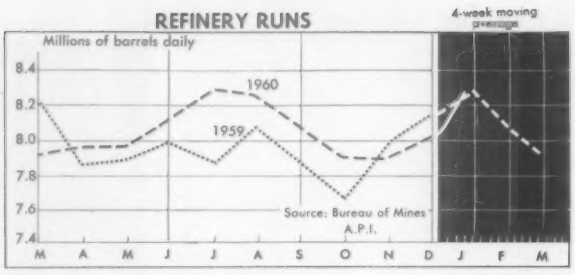

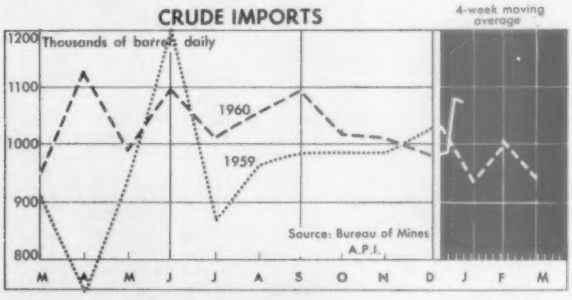

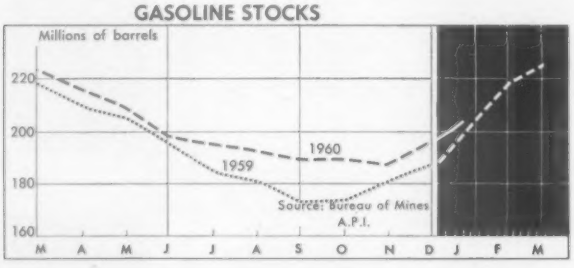

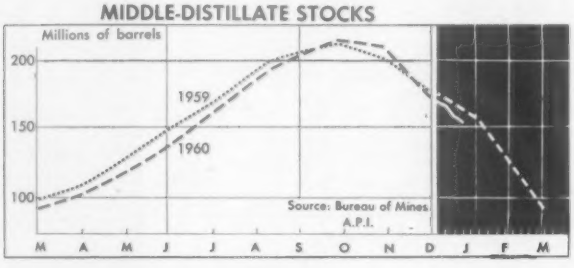

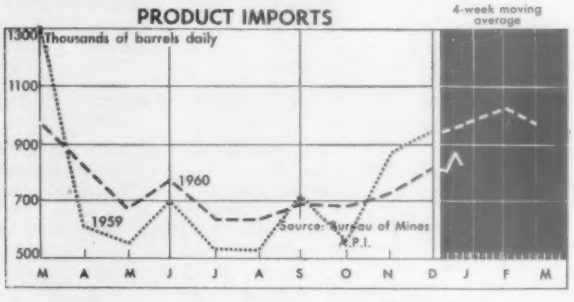

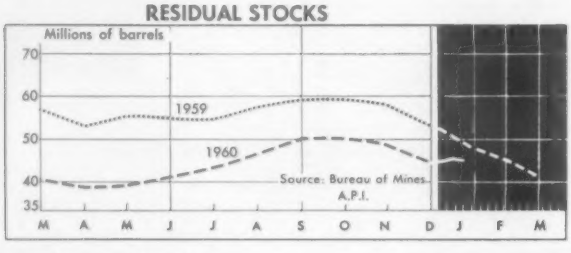

API REFINERY REPORT—JANUARY 20, 1961
(Thousands of barrels)

District—	Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.	Stocks‡ Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, January 1960 Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.
East Coast	1,133	504.7	37.0	381.3	153.7	43,866	11,715	44,526	12,776	1,123	493.3	39.9	322.2	160.7
Appalachian:														
District 1	104	43.7	5.1	23.0	13.6	5,913	724	3,302	577	103	39.3	4.0	23.5	15.5
District 2	96	49.0	8.9	17.6	11.3	3,101	391	1,412	359	108	54.6	7.9	20.8	17.4
Ind., Ill., Ky.	1,549	777.3	82.3	405.8	193.3	34,932	5,762	22,344	6,181	1,569	801.6	82.2	364.0	238.1
Minn., Wis., Dak.	131	67.0	7.4	26.9	19.3	7,019	1,035	6,692	644	125	59.9	7.5	26.6	21.7
Okla., Kans., Mo.	777	426.7	16.0	216.0	18.1	18,835	1,172	11,008	874	761	411.5	15.7	206.8	31.4
Inland Texas	298	213.7	8.0	50.6	18.3	7,655	462	1,496	2,498	302	211.1	10.9	52.3	22.6
Texas Gulf Coast	1,970	961.0	168.1	510.0	134.3	30,576	2,956	10,708	5,507	1,937	974.5	150.1	487.6	158.8
La. Gulf Coast	701	346.3	88.6	173.4	48.4	10,845	1,980	4,090	1,293	691	362.1	78.9	151.3	53.9
N. La. and Ark	110	70.3	4.4	22.6	7.0	5,723	625	2,486	139	103	71.5	6.8	22.5	8.7
Rocky Mountain:														
New Mexico	16	11.0	0.4	3.0	2.4	826	54	127	13	24	13.4	0.1	4.4	2.3
Other	295	141.9	6.0	61.1	32.4	6,620	350	2,388	1,026	297	142.5	3.3	69.3	35.5
West Coast	1,117	516.3	41.9	225.7	248.8	28,856	1,600	12,647	13,348	1,136	548.4	29.7	180.1	280.2
Jan. 20, 1961	8,357	4,128.9	474.1	2,117.0	900.9	204,767	28,826	123,226	45,235	8,279	4,183.7	437.0	1,931.4	1,046.8
Jan. 13, 1961	8,342	4,165.4	442.4	2,077.4	940.6	200,269	29,546	127,567	45,290	.....	.....	.....	.....	.....
Jan. 22, 1960	8,227	4,107.6	420.4	1,949.1	942.3	199,905	25,866	132,638	50,089	.....	.....	.....	.....	.....

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipelines.

Crude-Oil Prices

GRAVITY SCHEDULE

	Signal Hill, Calif.	Okla-homa	West Tex. (sour)	West Tex. (Inter.)	No.* Texas	Texas Refugio Light	Bayou Sale (La.)	Denver Jules-burg	Wyo. (sour)
14-14.9	$1.86	....	....	....	....	....	....	....	....
15-15.9	1.93	....	....	....	....	....	....	....	1.81
16-16.9	2.00	....	....	....	....	....	....	....	1.86
17-17.9	2.06	....	....	....	....	....	....	....	1.96
18-18.9	2.13	....	....	....	....	....	....	....	1.96
19-19.9	2.20	....	....	....	....	....	....	....	2.01
20-20.9	2.27	$2.49	$2.35	$2.61	$2.29	$2.95	$2.90	$2.58	2.06
21-21.9	2.33	2.52	2.38	2.63	2.33	2.97	2.92	2.60	2.11
22-22.9	2.40	2.55	2.41	2.65	2.37	2.99	2.94	2.62	2.16
23-23.9	2.46	2.58	2.44	2.67	2.41	3.01	2.96	2.64	2.21
24-24.9	2.53	2.61	2.47	2.69	2.45	3.03	2.98	2.66	2.26
25-25.9	2.60	2.64	2.50	2.71	2.49	3.05	3.00	2.68	2.31
26-26.9	2.67	2.67	2.53	2.73	2.53	3.07	3.02	2.70	2.36
27-27.9	2.74	2.70	2.56	2.75	2.57	3.09	3.04	2.72	2.49
28-28.9	2.81	2.73	2.59	2.77	2.61	3.11	3.06	2.74	2.54
29-29.9	2.87	2.76	2.62	2.79	2.65	3.13	3.08	2.76	2.59
30-30.9	2.93	2.79	2.65	2.81	2.69	3.15	3.10	2.78	2.63
31-31.9	3.00	2.82	2.68	2.83	2.73	3.17	3.12	2.80	2.67
32-32.9	3.06	2.85	2.71	2.85	2.77	3.19	3.14	2.82	2.71
33-33.9	3.12	2.88	2.74	2.87	2.81	3.21	3.16	2.84	2.75
34-34.9	3.17	2.91	2.77	2.89	2.85	3.23	3.18	2.86	2.79
35-35.9	3.22	2.94	2.80	2.91	2.89	3.25	3.20	2.88	2.83
36-36.9	3.27	2.97	2.83	2.93	2.93	3.27	3.22	2.90	2.87
37-37.9	3.31	2.99	2.86	2.95	2.95	3.29	3.24	2.92	2.89
38-38.9	....	3.01	2.89	2.97	2.97	3.31	3.26	2.94	2.91
39-39.9	....	3.03	2.92	2.99	2.99	3.33	3.28	2.96	2.93
40-44.9	....	3.05	2.95	3.01	3.01	3.35	3.30	2.98	2.95

*Cooke, Grayson, Montague.

Flat Prices

Louisiana:	
Sweet Lake	$3.00
Texas:	
East Texas	3.05-3.25
Conroe	3.23-3.53
Van	3.08
Pennsylvania Grade:	
Bradford	$4.75-4.80
Middle District	4.52
Southwest Pennsylvania	4.25
West Virginia	4.17
Buckeye Grade	4.08
Illinois Basin	**3.00-3.05**

Foreign

Middle East, Persian Gulf: (cargoes f.o.b. lifting port)	
Arabian, 34.0°-34.9°, Ras Tanura	$1.80
Iranian, 34.0°-34.9°, Bandar Mashur	1.78
Iranian, 34.0°-34.9°, Abadan	1.73
Iraq, 35.0°-35.9°, Fao	1.72
Kuwait, 31.0°-31.9°, Mina-al-Ahmadi	1.59
Qatar, 41.0°-41.9°, Umm Said	1.95
Middle East, E. Mediterranean:	
Arabian, 34.0°-34.9°, Sidon	$2.17
Iraq, Mosul-Kirkuk, 35.0°-35.9°, Tripoli	2.19
Far East (cargoes, f.o.b. Lutong, Sarawak):	
Seria Light, 36°	2.42
Canada:	
Leduc-Woodbend	$2.53
Redwater (Alta.)	2.42
Weyburn (light)	2.06
Midale C	1.69
Venezuela:	
Cumbarebo, 47°-47.9°, Tucupido	3.34
San Joaquin, 40°-40.9°, Puerto La Cruz	3.08
Oficina, 35°-35.9°, Puerto La Cruz	2.80
Tia Juana medium, 26°-26.9°, Amuay*	2.30
Quiriquire, 16.0-16.4°, Caripito	2.10
Lagunillas heavy, flat, Las Piedras*	2.10
Bachaquero, flat, 15°-16°, Las Piedras*	1.88

Prices for all crudes of 24° or lighter vary 2 cents per degree change, up or down. All crudes heavier than 24° vary 2.5 cents per half-degree gravity change.

*Also available at La Salina at 3 cents per barrel less.

Tanker Rates (Long Ton)

(Latest reported spot fixtures)

★ Gulf-NY, clean (ATRS+35%)	$3.85
★ Gulf-NY, dirty (ATRS+12.5%)	3.21
★ Carib.-NY, dirty (ATRS – 63.75%)	1.00
★ PG-NY, dirty (USMC – 67.5%)	4.13
★ PG-UK, dirty (Scale – 52.5%) (29s. 0d.)	4.06

★Denotes change from previous week.

Refined-Product Prices

Following quotations are realistic spot prices for refined products moving interstate on Wednesday each week. They may differ from refiners' posted prices and should not be considered as postings.

Light-product prices are in cents per gallon. Residual and crude prices are dollars per barrel. Crude prices are at the well unless otherwise listed.

Gasoline*

Mid-Continent (Group 3):	
★ Regular (91 octane)	12.00-12.50
★ Premium (99 octane)	14.75-15.25
Natural gasoline (26-70)	4.5
Breckenridge	4.0
Gulf Coast (cargoes for coastwise or export movements):	
Regular (90 octane)	11.00
Regular (92 octane)	11.25
Premium (98 octane)	12.25
California (rack) Los Angeles:	
Regular (90 octane)	11.30
Premium (95 octane)	12.30
Premium (100 octane)	13.80
Caribbean area (cargoes):	
Regular (87 octane)	10.125-10.25
Premium (97 octane)	11.75

*Quotations are for octanes shown. Prices usually vary with octane ratings within the regular, premium, and aviation grades.

Kerosine and Distillate

Mid-Continent (Group 3):	
Kerosine 42-44	10.875
Diesel oil (58 d.i. and above)	10.50
Distillate No. 1	10.50
Distillate No. 2	9.50
Gulf Coast (cargoes):	
Kerosine 41-43	9.75
★ Distillate No. 2	9.25
New York Harbor (barges):	
Kerosine 42-43	11.15
Distillate No. 2	10.15
Diesel fuel, 48-52 d.i.	10.55
Caribbean area (cargoes):	
Distillate No. 2	8.125

Residual Fuel (Bbl.)

Mid-Continent (Group 3):	
Residual fuel (max 1% S)	$1.90
Gulf Coast (cargoes):	
Bunker C fuel	2.30
New York Harbor (barges):	
Bunker C fuel	2.52
Caribbean (cargoes):	
Bunker C	2.10
California (rack):	
Bunker C fuel, Los Angeles	2.25

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3—S.V.G. 14¼" x 12", 175 W.P.
8—K.V.G. 7¾" x 14", 100 W.P.
4—L.V.G. 5¼" x 15", 3000 W.P.
1—Worthington 10" x 11", 100 W.P.
1—Worthington 10" x 9", 125 W.P.
1—Gardner-Denver Vertical Air Compressor 2" x 5½", 1500 W.P.
1—Gardner-Denver Unit Belt Driven 7¼" x 13", 500 W.P. 14" x 13", 175 W.P. Powered by L-3000 Leroi
1—Worthington Unit Belt Driven 4⅞" x 11", 1000 W.P. Powered by W.A.K. Waukesha
1—M.A. Clark Unit Skid-Mounted 4—10½" x 8" Headers, Scrubber and building
1—Worthington Unit Belt-Driven 8⅞" x 13", 300 W.P. 4½" x 13", 1100 W.P. Inner Cooler Powered by 6G-510 Superior
1—Chicago-Pneumatic Unit Belt-Driven 14" x 13", 60 W.P. After Cooler Powered by 145 G.K.U. Waukesha
1—X.O.B. Unit 5½" x 6" x 10"

VALVE MAINTENANCE COMPANY
Phone FE 2-2303 P. O. Box 100
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All No. 1 Grade Plain end and cleaned.

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12,000 BSD Naphtha
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30.7 MM BTU/hr.	CHROME Tubes	
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17 MM BTU/hr.	CHROME Tubes	
9.7 MM BTU/hr.	CHROME Tubes	
9 MM BTU/hr.	Carbon Tubes	
7.5 MM BTU/hr.	CHROME Tubes	(2)
5 MM BTU/hr.	Carbon Tubes	
2.5 MM BTU/hr.	Carbon Tubes	
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7,500 CFM @ 14.4 PSIG SUCTION 42.5 PSIG

Disch. Multi-Stage 8025 RPM driven by 1250 HP Synchronous Motor 3/60/2300/1200 RPM, 5 KW Direct Conn. Exciter, Falk Speed Increaser 6.70:1 Ratio, Precooler, Intercooler, and Aftercooler.

Send Us Your Requirements

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Box 5203, Baltimore 24, Maryland

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CLARK MA-4 Gas Compressor, 150 HP, skid-mounted with radiator and accessories; 2 I.R. XVG6 Gas Compressors; 225 HP Worthington LT6 Compressor; Pumps; Exchangers; Vessels. Brill Equipment Company, 4101 San Jacinto St., Houston 4, Texas.

ALDRICH 3¼ x 5 Triplex Pump, porcelain plungers, bronze-aluminum head, capacity 194 GPM 785 pound maximum; with 75 HP 900 RPM 3 Phase 60 cycle enclosed motor with controls. Good equipment at a good price. C. G. McLaren Company, Mayo Bldg., Tulsa, Oklahoma.

FOR SALE: Clark RA-8 crankshaft in excellent condition, main journals and crankpins refinished to standard undersize, prompt delivery. Guaranteed as new. Washington Iron Works, Inc., P. O. Box 28, Sherman, Texas.

THREE CARDWELL R.L. Double drum Spudders completely equipped in good condition, for sale reasonable or trade for production or oilwell equipment. Box M-251, The Oil and Gas Journal, Tulsa, Oklahoma.

1 BUCYRUS ERIE 48 L Spudder in excellent condition, powered by Waukesha Diesel WAKD motor. Price reasonable. M.H.O. Drilling Co. P. O. Box 297—Phone West 8-4242, Cut Bank, Montana.

CARDWELL DOUBLE DRUM 3,000'

complete portable drilling rig for sale.

L. J. FRERKING
Call Aztec, New Mexico
FEderal 4-2836

FOR SALE
PERFORATING TRUCKS
WILL FINANCE TO RELIABLE PARTY

Box M-216, The Oil and Gas Journal
Tulsa, Oklahoma

EQUIPMENT WANTED

WANTED: Used Failing, Joy or Sullivan—1500' to 2000'. Send complete description, prices, and locations to J. W. MenHall Drilling Co., Benton, Illinois.

WANTED: Used Kobe Pumping Components. Contact: W. H. Doran, Jr. P. O. Box 648, Alice, Texas.

COMPLETE 400-TON capacity Casing Pulling Outfit. Also, Service Rig equipped with structural mast. Advise price, location, age, condition, etc. Box M-239, The Oil and Gas Journal, Tulsa, Oklahoma.

HELP WANTED

WANTED

Refinery Superintendent, Chief Chemist, and Process Engineer with 3-5 years experience in Catalytic cracking, HF Alkylation, and Asphalt. Send complete resume of experience and salary range desire.

Box M-254, The Oil and Gas Journal
Tulsa, Oklahoma

HELP WANTED

REFINERY process engineer for independent corporation. Cost estimating, design and drafting experience. Submit resume of experience, education and salary expected. Box M-245, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER

Aggressive, independent company wants engineer with 3 to 5 years combination field and supervisory experience. Waterflood evaluation, development, and operation experience helpful. Permanent Tulsa base, some travel.

Box M-258, The Oil and Gas Journal
Tulsa, Oklahoma

WORLD-WIDE OPPORTUNITIES FOR Outsanding Pipe Line ENGINEERS

As a result of continued growth on an international scale, PIPE LINE TECHNOLOGISTS, INC. and affiliated companies will continue to have job opportunities for experienced Pipe Line Engineers.

We have opening at both intermediate and advanced levels in both the United States and foreign locations. Normally, the initial assignment of new staff members is in our Houston headquarters with the possibility of recurring short or long term assignments in other parts of the United States and foreign countries.

Resumes, which will be kept strictly confidential, are invited from graduate engineers with experience in responsible capacities in hydraulic and mechanical design of pipe lines and pipe line facilities, including pump stations, compressor stations and terminals. Experience in estimating and economic studies also desirable. Openings also are expected for experienced construction engineers capable of being assigned as Project Engineers.

These are unusual opportunities for well-qualified men who want to work in an atmosphere where the individual can have an important impact on the overall picture by the competent handling of challenging and out-of-the-ordinary job assignments.

Salaries commensurate with training and work experience. Liberal, well-balanced employee benefit plans.

Please include in resume full particulars regarding education, experience and salary requirements. Arrangements will be made for individual interview with interested and qualified persons.

Pipe Line Technologists, Inc.
3431 West Alabama P. O. Box 22146
Houston 27, Texas

HELP WANTED

OIL JOB DIRECTORY, foreign and domestic, showing where to apply for jobs $5.00 cash OIML Co., Box 2603, Tulsa, Oklahoma

CHEMIST WITH B.S. degree to work on refined wax products and emulsions. Petroleum wax laboratory. Experience required. Please submit resumé of experience and salary expected. Box M-244, The Oil and Gas Journal, Tulsa, Oklahoma.

CHIEF GEOLOGIST for the State of Texas. Independent Houston producing company wants Senior Geologist for Texas, including the Gulf Coast. Preferably 15 years experience, sound educational background. Location, Houston. Box M-253, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM REFINERY PROCESS ENGINEER

B.S. or M.S. Chemical Engineer with three to five years experience in General Refinery Process Design, preferably with emphasis on TCC or HCC catalytic cracking, sulfuric acid alkylation, catalytic reforming, vapor recovery systems.

If interested, airmail your resume and salary requirements to:

M. D. Daeschner
Assistant Refinery Manager
COMMONWEALTH OIL REFINING CO., INC.
P. O. Box 1406
Ponce, Puerto Rico

POSITIONS OPEN

PROCESS ENGINEER

Chemical Engineering degree required with a minimum of three years refinery experience including the operations of Fluid Catalytic Cracking Units and H.F. Alkylation Units.

MECHANICAL ENGINEER

A Mechanical Engineering degree required with a minimum of two years refinery maintenance experience in at least a foreman capacity.

FIRE MARSHAL and SAFETY INSPECTOR

Applicants should have experience as Fire Marshall and/or plant safety inspector in a refinery, chemical plant or a related industry.

These positions have been created as a result of a modernization program in a 15,000 bpd refinery. Employee benefits in effect are retirement plan, thrift plan, vacation, hospitalization and group insurance.

If interested in any of these positions send complete resume including references and salary range desired. All replies will be acknowledged and remain confidential. Mail to:

PERSONNEL DIRECTOR
MURPHY CORPORATION
Superior Refinery • Superior, Wisconsin

HELP WANTED

PROCESS ENGINEER

Position available for graduate Chemical Engineer with minimum 2 years experience processing work on light hydrocarbon or petrochemical plants.

Call or Write
T. D. Tabbert
Chief Process Engineer
The Fish Engineering Corp.
796 M & M Building
Houston, Texas

SITUATIONS WANTED

GEOLOGIST-PALEONTOLOGIST, B.S. 32, family, 8 years experience, subsurface, micropaleontology, administration in West Texas. Position desired; domestic, foreign, willing to work. Box M-255, The Oil and Gas Journal, Tulsa, Oklahoma.

GOOD VERSATILE Salesman and Lubrication Engineer. Age 38, solid family man, 16 years diversified Major Oil marketing experience with Stations, Jobbers, Distributors, Wholesale sales including OEM, Sales Promotion & Advertising, TBA, Real Estate, Lubrication Engineering and Instruction, etc. Excellent references. Member SAE and ASLE. Till recently Sales Promotion Manager and Sales Engineer for large custom lubricants manufacturer. Desire permanent connection in Sales Department of reputable progressive company. Will relocate. G. L. "Mac" McCumber, 1459 Woodland, Wichita, Kansas. Phone AM 2-7165.

MECHANICAL ENGINEER: 29, 5½ years production experience major oil company. Interested in progressive independent located in Tulsa or Fort Worth. Resume upon request. Box M-257, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOPHYSICIST, 25 years diversified domestic and foreign experience in petroleum exploration and research with major companies. M.S. mining engineer, four languages, no children. P. O. Box 521, Oklahoma City.

Instrument Engineer, BS, Registered ME in California, 36, 12 years experience design, construction and operation. Recently completed 2-year contract with foreign government in Middle East, wants overseas work for American company. Box M-230, The Oil and Gas Journal, Tulsa, Oklahoma.

EXPLORATION GEOLOGIST—35, ten years major oil company domestic experience, four years nationalized foreign company. Presently employed as Division Exploration Manager. Qualified to originate and direct sound economic exploration programs, evaluations, drilling deals, promotions, farmouts, domestic or foreign. Desire to return USA. Best references. Box M-243, The Oil and Gas Journal, Tulsa, Oklahoma.

21 YEARS DRILLING experience, Roughneck to Drilling Contractor, 40 years old. Desires position, foreign or domestic. Contact C. M. "Pat Jr." Ashby Jr. Ashby Drilling Co. 181 Meadows Building, Dallas 6, Texas.

AMERICAN, RETIRED executive of major oil company, excellent health, 43 years experience in Brazil in administration organization and sales. Valuable contacts local producers and refiners. Interested as part-time local representative supplier of crude oil, petrochemicals, or allied lines. Write Box M-231, The Oil and Gas Journal, Tulsa, Oklahoma.

WEST POINT GRADUATE, 29, ex-Paratroop Officer, top 1% in nation-wide College grad exam in 1952, seeks job in sales or admin with small or large house dealing in oil properties or well promotion. Some knowledge oil business, plus deep interest and drive for more. If potential exists, will go anywhere for interview or job. Experience shows I can match guts, drive, and sense anywhere. Box M-229, The Oil and Gas Journal, Tulsa, Oklahoma.

BOOKS

NATIONAL OIL Scouts Annual Year Books Volumes 8 thru 28 (1937-57) Set $200. Box M-256, The Oil and Gas Journal, Tulsa, Oklahoma.

SECURITY ANALYST

Have you had 5 years experience in the gas and oil industry?

A large New York Financial Institution is seeking such a man who in addition has marketing and financial background.
Salary will depend on depth of experience. Please send full particulars to:

Box M-250, The Oil and Gas Journal, Tulsa, Oklahoma.

MONEY RAISING

EXCELLENT DRILLING program on choice leases, Montgomery County, Kansas. Brought in good producer from Bartlesville sand last month. Need additional capital. We invite your investigation before investing. For information and references write S. & M. Drilling and Production Co., Box 59, Cherryvale, Kansas.

BUSINESS SERVICE

DELAWARE CORPORATION formed and serviced. American Guaranty & Trust Company. P. O. Box 487, Wilmington, Delaware.

INVENTORS

Do you want your drilling or production speciality or process developed and marketed? Either patented or applied for. Describe briefly; mail to Box M-259, The Oil and Gas Journal, Tulsa, Oklahoma. If interested, principal will negotiate; if not, will promptly advise.

CLIENTS WANTED

Expanding Tulsa consulting engineering firm desires additional clients. Our staff of registered professional engineers offers complete oil field engineering service: Exploration (geological, seismic, radioactivity), Mapping, Drilling-Completion-Production Supervision, Reservoir and Property Evaluations, Property Acquisition and Sale. We can serve as your engineering department and field force or augment your present one—anywhere, anytime—per diem, retainer, or contract. We welcome inquiries from responsible principals—strictest confidences practiced.

Box M-240, The Oil and Gas Journal
Tulsa, Oklahoma

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OIL FIELD TOOLS and equipment sales representation for American manufacturers. Offered for Italy and North Africa especially, by Italian engineer, retiring from large company. Highest references. Italy and U. S. Address: Box 31 R 961, The Oil and Gas Journal, 4041 Marlton Ave., Los Angeles 8, California.

EXPERIENCED AND responsible driller-operator desires 7 associates to join with him in drilling 7 shallow ventures in Texas and Kansas. Clean deal. 807 West Tuckey Lane, Phoenix 13, Ariz.

FINANCIAL—Investment Banking Houses and Underwriters reached. Confidential You can send the details of your proposition dirict or thru your attorney to Consultant 817—81st Street, Brooklyn, N. Y.

CAPITAL NEEDED

UNDER-FINANCED Independent producing company seeks contact with group capable of underwriting part of exploration program for two year period. Excellent key personnel already retained. Geological and Land work now being done. $100,000.00 per year investment needed for 40% of deal. Box M-242, The Oil and Gas Journal, Tulsa, Oklahoma.

OIL MAPS

CONTOURED MAPS AVAILABLE

covering approximately 90 townships in the
McALESTER BASIN
of eastern Oklahoma
Also 30 townships in southern Oklahoma
THE R. P. WILKINSON MAP COMPANY
623 Fransley, Ardmore, Oklahoma

LEASE AND DRILLING BLOCKS

WANT TO PURCHASE Gas and Oil Properties—Submit Reserve Estimates, Income, etc. Box M-210, The Oil and Gas Journal, Tulsa, Oklahoma.

OIL AND GAS LEASE

approx.

600,000 acres

For participation or sale—covering the entire coastline of a southeastern coastal state on their entire tidelands and marshlands.

Strong potential for gas and oil discovery. Excellent geology.

Do not respond unless financially able to engage in this type exploration. Owner.

Box M-252
The Oil and Gas Journal
Tulsa, Oklahoma

LEASE AND DRILLING BLOCKS

FOR SALE: 110 acres land owners royalty in West Short Juntion Field, Cleveland County, Oklahoma. Waterflood to start soon. Can be verified with major operators. Contact Box 602, Oklahoma City, Oklahoma.

OIL LEASE CRANE County, Texas: Available S/230 acres, Section 18, Block B-28, PSL, two miles from new gas discovery Section 23, Blk. 4, H&TC, Hill & Meeker well. Quick action, address landowner: Jefferson G. Smith, 715 Littlefield Building, Austin 15, Texas.

OHIO AND WEST VIRGINIA acreage for sale close to Big Play. Specialize in 10-15 thousand acre blocks or will lease on your form anywhere in the East. David Law, 716 Union Trust Bldg., Parkersburg, West Virginia. Phone: HU 5-6446.

WANTED TO BUY

Oil Production 50 to 200 bbls./d Mid-Continent area. Please answer:

Box M-127
The Oil and Gas Journal
Tulsa, Oklahoma

NOTICE

SALE OF OIL AND GAS MINING LEASES TRIBAL AND ALLOTTED INDIAN LANDS

DEPARTMENT OF THE INTERIOR
BUREAU OF INDIAN AFFAIRS
Fort Peck Indian Agency
Poplar, Montana

SEALED BIDS will be received until 10:00 A. M. Mountain Standard Time, February 14, 1961, and opened at that time at the Fort Peck Indian Agency, Poplar, Montana, for the leasing of 48 tracts of Tribal land comprising 7,460.48 acres and 193 tracts of individually owned trust or restricted Indian lands comprising 33,709.93 acres located in Roosevelt County, Montana for oil and gas mining purposes.

DETAILS of the lease offering and how and where to file bids may be obtained by addressing the inquiry to the Superintendent, Fort Peck Indian Agency, Poplar, Montana, or telephone Poplar, PO-8-3441.

NOTICE

SALE OF OIL AND GAS MINING LEASES TRIBAL AND ALLOTTED INDIAN LANDS SALE NO. 12

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF INDIAN AFFAIRS
Crow Indian Agency
Crow Agency, Montana

Sealed bids will be received until February 16, 1961, 2:00 o'clock, P.M., Mountain Standard Time, and opened at that time in the office of the Crow Indian Agency, Crow Agency, Montana, for the leasing of 5,280.00 acres of tribal land and 1,320.00 acres of allotted lands all located in Twp. 6 South, Rge. 32 East, Big Horn County, Montana, for oil and gas mining purposes. The details of the lease offering and how and where to file bids may be obtained by addressing the inquiry to the Superintendent of Crow Indian Agency, at Crow Agency, Montana.

LEGAL

SEALED BIDS will be received until 10:00 A.M. Mountain Standard Time, February 23, 1961, and opened at that time in the office of the Navajo Indian Agency, Window Rock, Arizona, for oil and gas leases, on 56 tracts of tribal lands, totaling approximately 95,130.48 acres, located in San Juan County, New Mexico.
Details of the lease offering and filing of bids may be obtained by addressing an inquiry to the General Superintendent, Navajo Indian Agency, Attention: Branch of Realty, Window Rock, Arizona.

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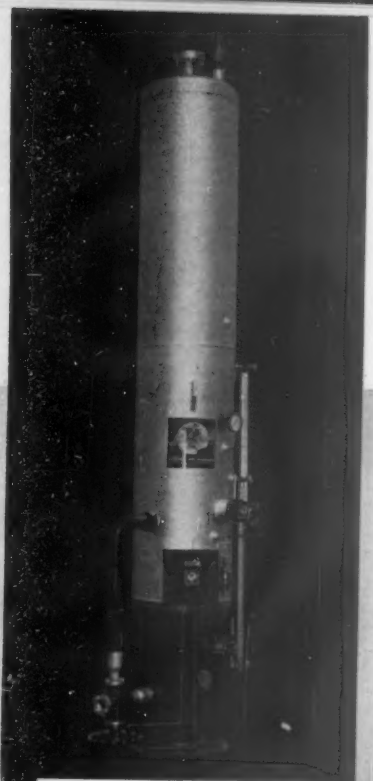

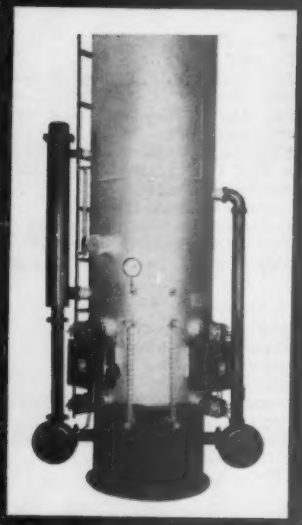

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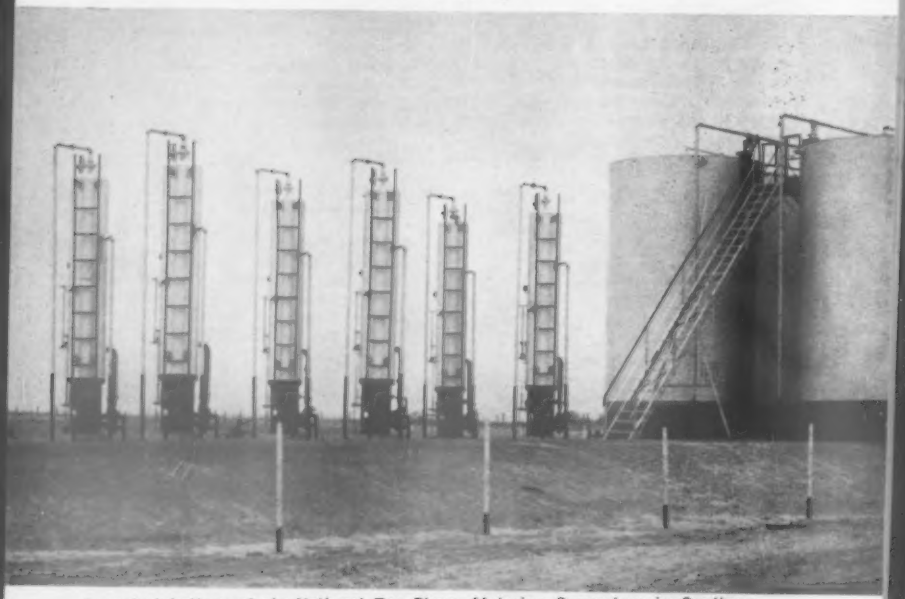

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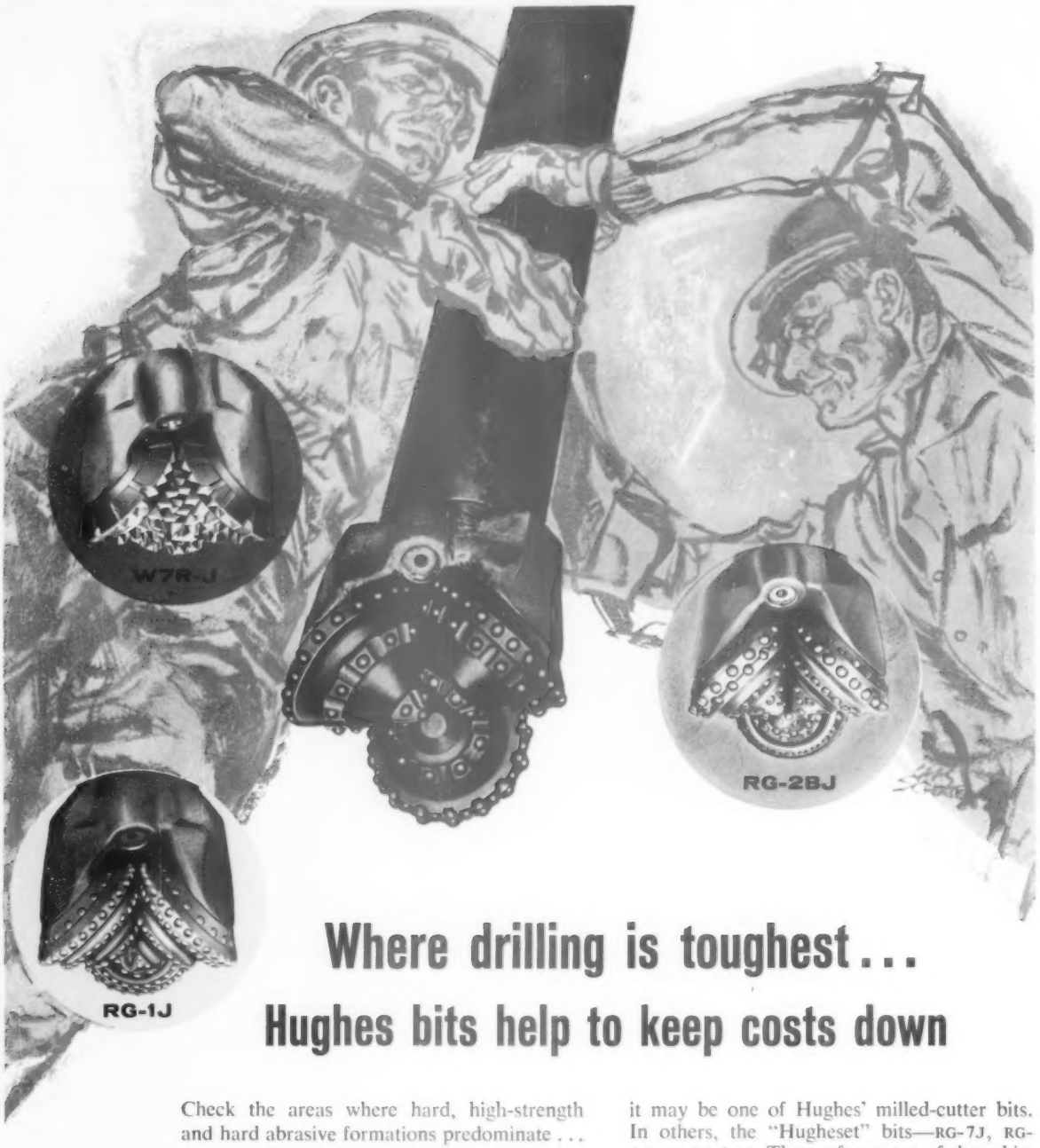
SERVICE

'ROUND-THE-CLOCK

Pumping unit value is only as good as the service that stands behind it. This is why Cabot maintains convenient 'Round the Clock service centers throughout the oil industry . . . service centers with complete stocks of Cabot parts and manned by factory trained personnel. This is your 24-hour-a-day guarantee that Cabot will deliver dependable pumping. CALL YOUR J&L MAN...

OIL FIELD PUMPING EQUIPMENT
CABOT
PAMPA, TEXAS
FRANKS

CABOT CORPORATION
MACHINERY DIVISION



Where drilling is toughest...

Hughes bits help to keep costs down

Check the areas where hard, high-strength and hard abrasive formations predominate... there you'll find operators relying on Hughes bits to keep costs down.

Why? Because Hughes bits through the years have reflected the experience and knowledge gained by Hughes engineers in designing bits to drill the world's *hardest-to-drill* formations.

Your local Hughes representative can help you select the types of bits that will deliver your *most economical footage*. In some cases, it may be one of Hughes' milled-cutter bits. In others, the "Hugheset" bits—RG-7J, RG-1J, or RG-2BJ. The performance of these bits is spectacular where air or airmist is used as the circulating medium.

Or, it may be one of the new "Hugheset" *sealing bearing bits*, now making footage previously undreamed of in formations where bits are exposed to abrasive-ladened fluids.

Wherever you drill, an experienced Hughes representative can help you set up a cost saving bit program.

HUGHES TOOL COMPANY ORIGINATOR

AND WORLD'S LEADING DEVELOPER OF CONE-TYPE ROCK BITS